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South Dakota Field Office
Belle Fourche, South
Dakota

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Exemption Area Wildland-Urban Interface Project

Environmental Assessment

ENVIRONMENTAL ASSESSMENT NUMBER: **MT040-2002-0024**

PROJECT NAME: EXEMPTION AREA WILDLAND-URBAN INTERFACE PROJECT

LEGAL DESCRIPTION: T4N, R2E-R3E; T5N, R2E-R3E. Black Hills Meridian, Lawrence County, SD.

APPLICANT: Bureau of Land Management, South Dakota Field Office, 310 Roundup St., Belle Fourche, SD. 57717. Phone 605-892-7000

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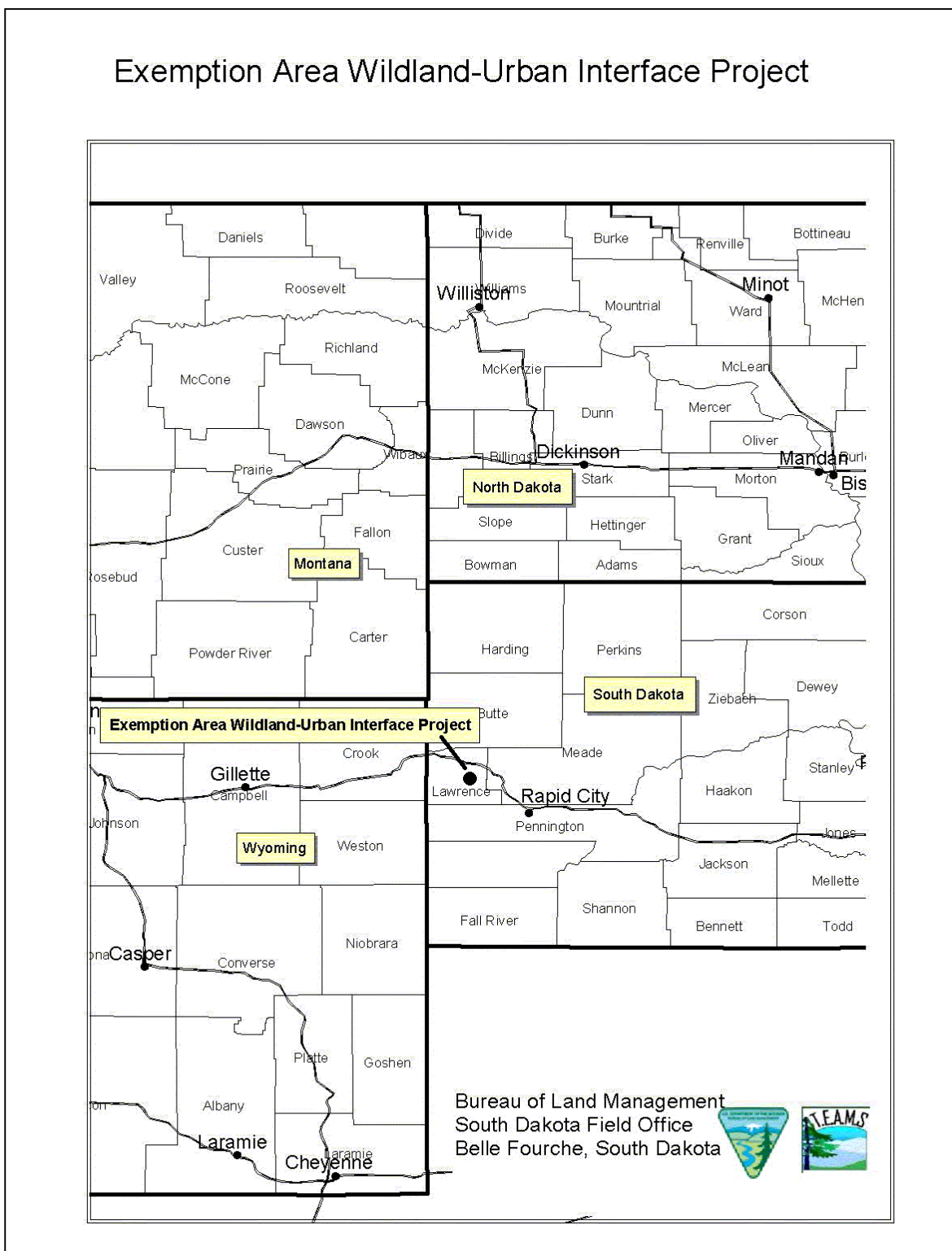
Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Bureau of Land Management, South Dakota Field Office, 310 Roundup Street, Belle Fourche, South Dakota 57717, # 605-892-7000. Additionally, the environmental documents and many of the documents in the project planning record are available on the Bureau of Land Management Internet web site at: <http://www.mt.blm.gov/sdfo.html>.

The environmental analysis for this project and the completion of the NEPA document was contracted to the USDA-Forest Service Enterprise Group: T.E.A.M.S. The preparers from T.E.A.M.S are noted at the end of this EA.



Exemption Area WUI Project

Figure ii-1: Exemption Area Wildland-Urban Interface Project, general locale map



1 Purpose and Need

1.1 INTRODUCTION

This Environmental Assessment (EA) examines the potential effects of fuels reduction and forest thinning activities in the **Exemption Area Wildland-Urban Interface Project** area. The project area is located in Lawrence County SD, and is within the Exemption Area (See [Figure 1](#) below and [Figure ii-1](#) on facing page).

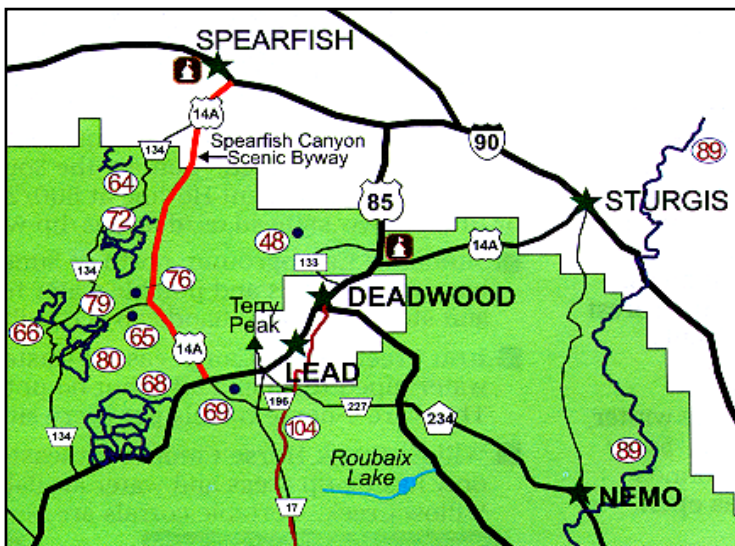


Figure 1: Exemption Area. The darker shade (green) is primarily the Black Hills NF, while the lighter (white) boxed area around the cities of Lead and Deadwood is known as the Exemption Area.

This area is surrounded by the Black Hills National Forest, however the public lands within the Exemption Area are managed by the Bureau of Land Management, South Dakota Field Office, Belle Fourche, South Dakota. There are also private and State managed lands within the Exemption Area. The communities of Lead, Deadwood, and Central City are within the project area and these communities and adjacent rural subdivisions are the main focus of hazardous fuels treatments proposed for this Wildland-Urban Interface¹. This EA discloses the direct, indirect,

and cumulative environmental impacts and any irreversible or irretrievable commitment of resources that would result from the proposed action and any alternatives.

The Interdisciplinary Team (IDT) used a systematic approach for analyzing the proposed project and alternatives to it, estimating the environmental effects, and preparing this Environmental Assessment. The planning process complies with NEPA² and the CEQ³ regulations. Planning was coordinated with the appropriate Federal, State, and local agencies, and local federally recognized tribes.

¹ Wildland Urban Interface (WUI) is defined as: The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels, (available at: <http://www.fireplan.gov/glossary.cfm>).

² NEPA – National Environmental Policy Act. 1969

³ CEQ – Council on Environmental Quality

1.1.1 PROPOSED ACTION IN BRIEF

The Bureau of Land Management (BLM) - South Dakota Field Office is proposing fuels reduction treatments on approximately 2,675 acres of forested lands managed by the Bureau of Land Management (BLM) in response to the urgent management need to reduce hazardous forest fuels within the Exemption Area and within selected Wildland Urban Interface (WUI) emphasis areas in particular. The WUI's are priority treatment areas around occupied subdivisions, towns, or other important human assets, and are approximately ½ mile buffer zones around each designated area. The WUI emphasis areas were developed by collaborative efforts between the BLM, South Dakota Forestry Dept., Lead and Deadwood city fire departments, and other community partners.

Forested stands would be treated using a combination of commercial harvest followed by noncommercial thinning (1,500 acres), non-commercial thinning only (115 acres), and post-fire fuel reduction treatments (within the area of the 2002 Grizzly Gulch Fire) on 755 acres. In addition, a network of Fire Containment Zones (FCZ's) are also proposed for 13.0 miles on BLM lands within the Exemption Area, (50 miles total (BLM and private) inside Exemption Area, 78 miles total (BLM, private and USFS) both inside and outside Exemption Area), to provide fire suppression crews safe corridors to utilize aggressive suppression techniques on wildfires. The FCZ's are linear treatment buffers (100-300 feet wide) usually along an existing road or trail that would provide safe access to fire crews. The fuels reduction treatments within the FCZ's would be more aggressive than other forest stand fuel reduction treatments proposed. Additionally, fuels created by the thinning activities would be treated by piling and burning in late fall, or by mechanical crushing, or whole tree yarding. No new permanent road construction would be needed to access treatment areas. Chapter 2 has a detailed description of the proposed action, treatment prescriptions, and [Appendix B](#) notes additional specific project design criteria for the proposed action. See [Appendix A, Maps #A-3, and #A-4](#) for maps displaying the proposed fuel reduction treatments.

The entire Exemption Area contains approximately 22,520 acres of intermingled private and Bureau of Land Management lands. There are approximately 5,220 acres of BLM managed lands within the Exemption Area; however, fuel reduction treatments in this proposal are primarily focused on BLM lands in the Wildland Urban Interface (WUI) emphasis areas.

There are a total of eleven (11) WUI emphasis areas designated within the Exemption Area; however, this proposal would treat BLM forested stands in only eight (8) of the WUI emphasis areas. Two of the WUI emphasis areas have no BLM lands, and the BLM lands within the other WUI emphasis area (Hearst) are currently being treated under a previous decision (*Hearst Project EA#: SD-SDFO-2001-0013, Sept. 07, 2001*). See [Appendix A, Map #A-1](#) for the locations of the WUI emphasis areas.

The eleven (11) WUI emphasis areas in the Exemption Area WUI project are noted in [Table 1](#). The eight (8) WUI emphasis areas proposed in this analysis for treatments on BLM lands are noted by **(bold)**:

Table 1: WUI Emphasis Areas, Acres by Ownership

WUI Emphasis Area	Total Acres	Pvt. Acres	BLM Acres
1. Blacktail Gulch	407	374	33
2. Central City	449	449	0
3. Deadwood North	424	398	26
4. Deadwood South	1072	591	481
5. Deer Mountain	916	830	86
6. Englewood	1528	762	766
7. Grizzly Gulch	394	190	204
8. Hearst ¹	639	514	125
9. Kirk	502	502	0
10. Nevada Gulch	1841	1051	790
11. Peedee Gulch	514	383	131
Totals	8,686	6,044	2,642

¹ The Hearst WUI is currently being treated for hazardous fuels.

1.1.2 RELATIONSHIP OF PRIVATE LANDS TO EXEMPTION AREA FUELS REDUCTION STRATEGY

The Exemption Area project proposes to implement specific treatments only on BLM managed lands. However, for the larger scale fire hazard reduction strategy in the Exemption Area to be most effective, substantial fuel reduction treatments would be needed on private lands within the Exemption Area that are adjacent to BLM managed lands proposed for treatments. To facilitate this, fire hazard level estimates for adjacent private lands would be available to the state and local agencies and private landowners. That information, along with the specific treatment prescriptions and recommendations implemented on BLM lands, would be available for use as guidance to develop potential fuel reduction treatments on private lands within the Exemption Area.

The majority of the lands within the Exemption Area and within the WUI emphasis areas are under private ownership (WUI total = 8,686 acres, of which private ownership is 6,044 acres). In addition, the majority of areas that would be treated to create a network of Fuel Containment Zone buffers would be also under private ownership. Therefore, an effective overall fuels reduction strategy would require the involvement of many different private landowners and the state and local agencies to implement those treatments in the next decade.

1.2 BACKGROUND

Between 1978 and 1999, in the Exemption Area, federal agencies have responded to 25 fires that burned an estimated 11 acres⁴. Average fire size was 0.4 acres; however, these communities were impacted by destructive wildfires in the late 1800's, the early 1900's and as recent as 2002. In late 1959, the Deadwood Fire burned 4,500 acres in two days and nearly destroyed the city of Deadwood. The most recent catastrophic wildfire occurred in June 2002, the Grizzly Gulch Fire.

⁴ Fire Management Plan for Montana and Dakotas. DRAFT. Aug. 2001. Bureau of Land Management, Montana State Office. Appendix J: SD Field Office Fire Management Plan, Exemption Area (B2).

The Grizzly Gulch Fire is the most recent example of a large wildfire that demonstrates the urgent need for fuel reduction treatments within the Exemption Area. The Grizzly Gulch Fire started on June 29, 2002 on private land in the Exemption Area. The fire grew to 11,589 acres and burned over 1,982 acres of BLM managed lands within the Exemption Area. Several homes were either destroyed or damaged and over 700 volunteer, state, and federal firefighters worked to control this fire. The Grizzly Gulch fire affected portions of four WUI's being proposed for fuel reduction treatments, including the Grizzly Gulch, Deadwood South, Peedee Gulch, and Kirk WUI emphasis areas. The Deadwood South WUI was almost completely burned and post-fire salvage logging is ongoing (*Grizzly Gulch Salvage EA#: MT-040-2002-0019, July 29, 2002*). [Appendix A, Map #A-5](#) shows the area in and adjacent to the Exemption Area that was affected by the Grizzly Gulch Fire.

1.3 PURPOSE OF AND NEED FOR ACTION

The Exemption Area Wildland-Urban Interface Project is proposed at this time to respond to goals and objectives of the National Fire Plan, the National 10-Year Comprehensive Strategy, the draft BLM Fire Management Plan for Montana and the Dakotas, and the 1985 Resource Management Plan for the South Dakota Resource Area. Comparison of the existing condition of the project area and the desired conditions for the project area indicates a critical management need for:

- Reduced forest density and fuels loading.
- Reduced risk of uncharacteristically intense fire.
- Reduced risk to life, property, and natural resources.
- Increased safety to fire suppression crews.
- Development of sustainable forest conditions.
- Restoration of natural ecological systems.

1.3.1 AFFECTED ENVIRONMENT RELATED TO HAZARDOUS FUELS

The Exemption Area contains the “communities at risk”⁵ of Lead, Deadwood, Central City, Pluma, and Englewood as well as numerous subdivision areas. Aerial photos from the 1950s show a continuous ponderosa pine canopy leading up to affected communities. Photos from 1961 show thinning had occurred in many of these pine stands after the 1959 Deadwood Fire and seemed to have reduced the threat from hazardous fuels. These thinned stands appear to have been maintained until the late 1970's, when an insect epidemic attacked the thick ponderosa pine stands surrounding the thinned area. Mechanical silvicultural treatments were applied in response to the insect attack.

At present, much of the forested stands in the project area consist of very dense, mid-aged stands of ponderosa pine. Due to fire suppression and a lack of active forest management in

⁵ Federal Register Notice Vol. 66, No. 160, Aug. 17, 2001. Urban Wildland Interface Communities within the vicinity of Federal Lands that are at high risk from wildfire.

these stands, a situation has resulted where these stands have a dangerous susceptibility to catastrophic crown fire. When it happens, a catastrophic crown fire within the Exemption Area could quickly out-pace suppression capabilities and could result in another stand replacement fire event similar to the Grizzly Gulch Fire.

The most significant concern and constraint are the amount and proximity of the existing wildland-urban interface areas. The risk of wildland fire in a wildland-urban interface area is a major concern in the Exemption Area. Most of the land in the Exemption Area lies within 3 miles of either the city of Deadwood or Lead. Dozens of permanent and vacation homes, businesses, municipal buildings, and commercial developments are in close proximity to BLM administered public lands and hazardous fuels ([See Appendix A, Map #A-1](#)). The combination of steep slopes and dense stands of pine cover create a hazardous fuel load for much of the area. Adjoining private land owners both request and constrain fire management proposals. This situation will require close coordination between private landowners and the Bureau of Land Management.

A fire hazard level rating system was used to assess the fire hazard for each forested stand in the WUI emphasis areas. Each stand was rated as high, moderate, low-moderate, or low fire hazard based on four rating factors:

1. Overstory forest vegetation structure and density,
2. Understory forest vegetation and ladder fuels,
3. Surface fuel loading at ground level, and
4. Slope gradient of each stand.

Analysis conducted in 2001-2002 has determined that hazardous fuels and high to moderate fire hazard levels are found on approximately 65% of the forested lands (all ownerships) within the eleven (11) Wildland Urban Interface emphasis areas ([See Appendix A, Map #A-2](#)). Approximately 56% of the Bureau of Land Management acres in the WUI's are noted as having high and moderate fire hazard levels.

1.3.2 DESIRED OBJECTIVES FOR THE PROJECT AREA

There is a management need to reduce the fire hazard rating from high, moderate, or low-moderate, to a low rating for all of the priority WUI emphasis areas in the Exemption Area Wildland-Urban Interface Project area. The desired forest stand conditions that would result in a low fire hazard level include the following:

1. Canopy closure is less than or equal to 40% in ponderosa pine stands.
2. Ladder fuels (smaller trees) are removed and an even-aged stand is the result.
3. Tree density is reduced to approximately a 60-80 basal area (current conditions range from 160-250 basal area).

4. Tree crowns are approximately 10-15 feet apart (20-25 feet between tree trunks). This distance reduces the risk of a canopy fire.

1.4 MANAGEMENT DIRECTION

The Management direction discussed in this section will include:

1. Resource Management Plan (RMP), South Dakota Resource Area, November 1985.
2. Fire Management Plan for Montana and the Dakotas, August 2001.
3. National Fire Plan Key Points.
4. 10-Year Comprehensive Strategy Goals.
5. Other management direction, statutes, regulations, and other plans.

In addition, the proposed Lawrence County Urban Wildland Interface Ordinance (May 2001) will be discussed in relationship to the project objectives.

1.4.1 RESOURCE MANAGEMENT PLAN-SOUTH DAKOTA RESOURCE AREA

The proposed actions identified in this environmental assessment are in conformance with the management direction in the RMP, 1985.

- Specifically, direction for fire management (*RMP, p. 10*) notes that no fires are allowed to burn unless covered by an approved prescribed fire plan or modified suppression plan. Suppression action will be taken on any fires on or threatening public lands. The RMP also notes that the prescribed fire program has not been pursued in the past and that prescribed burning could be used as an alternative to mechanical treatment.

The proposed action would not use prescribed fire as an alternative to mechanical treatment due to the high fire hazard and fuel loading in the WUI emphasis areas; however, prescribed fire would be considered as a tool for maintenance of forested stands once mechanical treatments reduce the fire hazard to low.

- Specifically, direction for Forestry (*RMP, p. 14*) notes that forestry products such as firewood, posts, poles, and timber are sold on an incidental basis.
- The Management Framework Plan for the Exemption Area (*RMP, p. 137*) notes that the timber harvest should be based on the resources production capability.

1.4.2 FIRE MANAGEMENT PLAN FOR MONTANA AND THE DAKOTAS

The Draft Fire Management Plan (FMP) for the Montana and the Dakotas was released in August 2001. Although this FMP is still considered DRAFT and has not been officially adopted as of April 2003, the fuels reduction management guidance portions of the Draft FMP are likely to be adopted as written. For these reasons, it is prudent to disclose how the Exemption Area project would comply with management direction from the Draft FMP. The specific management for the South Dakota Field Office (including the Exemption Area and the Exemption Area Wildland-Urban Interface Project area is found in Appendix J of the draft Fire Management Plan (pp. 130-133).

The proposed action would accomplish many of the objectives of the Fire Management Plan, with an emphasis on reducing wildland fire risk to “communities at risk”, rural subdivisions, and other facilities and commercial uses.

1.4.3 NATIONAL FIRE PLAN (NFP) DIRECTION & 10-YEAR COMPREHENSIVE STRATEGY DIRECTION

The proposed action and activities are in conformance with the National Fire Plan under all the 5 key points. Additionally, the proposed project responds to the goals of the 10-Year Comprehensive Strategy.

The key points of the NFP⁶ are:

1. Firefighting preparedness
2. Rehabilitation and restoration of areas affected by wildfire
3. Hazardous fuels reduction
4. Promote community assistance
5. Accountability

The goals of the 10-Year Comprehensive Strategy⁷ are:

1. Improve Fire Prevention and Suppression
2. Reduce Hazardous Fuels
3. Restore Fire-Adapted Ecosystems
4. Promote Community Assistance

⁶ <http://www.fireplan.gov/index.cfm>

⁷ http://www.westgov.org/wga/initiatives/fire/final_fire_rpt.pdf

1.4.4 PROPOSED LAWRENCE COUNTY URBAN WILDLAND INTERFACE ORDINANCE

This ordinance does not control management on BLM lands; however, the Exemption Area Wildland-Urban Interface Project is the result of community efforts, including Lawrence County Fire Advisory Board and the Fire Departments of Lead and Deadwood. For that reason, this draft ordinance (May 2001) is important to the development of the Exemption Area Wildland-Urban Interface Project.

The Exemption Area Project proposed action would provide private landowners information on the fire hazard ranking of adjacent private forested lands. Information on the specific fuel treatments prescriptions proposed on adjacent BLM lands would be made available to private landowners and the State of South Dakota. The National Fire Plan and the 10-Year Comprehensive Strategy included provisions that would allow private landowners to apply to State and Local agencies to receive funding for treatments of hazardous fuels on private lands.

1.4.5 RELATIONSHIP TO OTHER STATUTES, REGULATIONS, AND OTHER PLANS

The Federal Land Policy and Management Act (FLPMA) of 1976 established the policy and guidelines for the administration, management, protection, development, and enhancement of public lands. The proposed project is in conformance with the laws, statutes, and direction noted in this section. Laws governing the management of public lands include the Archeological Resource Protection Act of 1974, National Historic Preservation Act of 1966 as Amended (1980), National Environmental Policy Act of 1969, as Amended, 1973 Endangered Species Act, as amended, Bald Eagle Protection Act of 1940, Migratory Bird Act of 1918, and Clean Air Act of 1977, as amended. Proposed management is also consistent with the guidance provided by the 1995 Review and Update of the Federal Wildland Fire Management Policy and the 2001 Amendment.

1.5 PUBLIC INVOLVEMENT

In addition to the following specific activities, the Exemption Area Wildland-Urban Interface Project has been listed on the BLM Montana State Office Schedule of Proposed Actions, and the project information has been posted on the BLM website. The BLM has a formal Resource Advisory Committee (RAC) process for proposed projects and the Exemption Area WUI project was brought before the RAC group on two occasions. [Table 2](#) lists the specific scoping and public involvement activities taken for this project to date.

Table 2: Scoping and Public Involvement Activities

Description of Scoping and Public Involvement	Date
Initial meetings with FS, State, City, County, and local involved publics	2000/10/30
BLM-Tribal meeting for project consultation	2001/02/21
Briefing to Lawrence County Commissioners, with follow-up article in Lawrence County Centennial newspaper	2001/03/22
Resource Advisory Committee (RAC) presentation	2001/03/26
Article in Black Hills Pioneer newspaper	2001/04/18

Table 2: Scoping and Public Involvement Activities

Description of Scoping and Public Involvement	Date
Congressional briefing on project status	2001/08/16
Scoping Letter on initial project proposal. 8 comments recorded	2001/10/26
Legal Notice in Black Hills Pioneer	2001/11/06
Resource Advisory Committee (RAC) presentation	2002/02/25
BLM-Tribal meeting for project consultation	2002/05/21
Article in Rapid City Journal Newspaper	2002/06/23
Presentation to Lawrence County Commissioners and Deadwood City Council	2002/06/24
Scoping Letter on detailed proposed action mailed to 200+ addresses 21 comments recorded	2003/01/10
Article in Black Hills Journal newspaper regarding upcoming open house public meeting	2003/02/01
Open house public meeting in Deadwood SD 30-40 attendees.	2003/02/06
BLM-Tribal meeting for project information	2003/02/26

1.5.1 PUBLIC COMMENTS SUMMARY

The scoping letters received from Federal or State Agencies, State or Local governments, businesses, organizations, and other groups as well as those from individuals are found in the project file. Public comments tended to strongly support the project objectives to reduce hazardous fuels in the WUI emphasis areas. Many local landowners and other local individuals expressed concern at the length of time it was taking to start the treatments. Some concerns were expressed regarding Native American cultural sites, noxious weeds, impacts on the Mickelson Trail, air quality, and potential for trespass on private land. These issues and concerns raised through the public scoping process are discussed in the next section.

1.6 ISSUES

Scoping and public involvement activities are used to identify issues/concerns about the effects of the proposed action. There were no significant issues identified during internal or external scoping and none were carried forward for the Exemption Area Wildland-Urban Interface Project.

The following issues/concerns were determined to be of interest to the involved public that responded and therefore will be tracked in this analysis to allow for easy understanding of the resolution for those issue/concerns. These issues have been resolved using project design criteria or the environmental analysis disclosure noted that no effects would occur on the resource area of concern. [Table 3](#) lists the issues considered for this analysis:

Exemption Area WUI Project

Table 3: Issues

Issue	Source	Discussion and Resolution
Cultural Resources	Cheyenne River Sioux Tribe	Concern over the impacts to Native American cultural resources from the project activities. <u>Resolution:</u> Tribal Governments have been consulted concerning traditional cultural properties within the project area, and SHPO concurrence documented before activities occur in any treatment units. All significant cultural sites would be protected. Project design criteria would include notification of BLM Archeologist if any new cultural sites are found.
Noxious Weeds	Lawrence County, public, and internal IDT team	Concern over the spread of noxious weeds caused by project ground disturbing activities. <u>Resolution:</u> Noxious weed surveys during activities would occur as a project design criteria. Project design criteria would also include cleaning of heavy equipment before accessing the area. Monitoring would be done post-project to control noxious weeds.
Recreational Access and Impacts on Mickelson Trail	SD Dept. of Game, Fish, and Parks.	Concern over the impact of project activities on the use, access, and visual quality for the Mickelson Trail users. <u>Resolution:</u> Analysis notes short-term restrictions for safety; however, no changes in the recreational access to this area will occur in the long-term. Activities would be restricted from significantly impacting the Mickelson Trail and project design criteria would protect this important recreation resource.
Air Quality	Public	Concern over the effects of smoke on human environment from burning of fuels. <u>Resolution:</u> Discussed in Critical Elements Section, and also addressed in project design criteria. Any burning would require an approved burn plan. Burning would not occur in conditions that would result in heavy smoke concentrations for the area.
Prescribed Fire Risks	Public	Concern over the danger to private property of using prescribed fire close to adjacent private land and property. <u>Resolution:</u> Treatments would use prescribed fire with great care, however prescribed fire would be used extensively as long-term maintenance treatment in appropriate areas in about 5-7 years. Fuels in close proximity to private lands would be treated using hand piles only, and burning of those piles would occur in late fall during safe conditions.
Private Land Trespass	Public	A private landowner expressed a concern over their understanding that this project would allow the BLM to conduct management activities on private lands without private landowners involvement or consent. <u>Resolution:</u> No management activities would occur on private lands by the BLM as a result of this project. Boundary lines between BLM and private would be determined before treatments are begun. Any needed road access across private lands would require a temporary right-of-way agreement between the private landowner and the BLM. Private landowners that are interested in treating their hazardous fuels can partner with local and State agencies for fuel reduction assistance on private lands.
Visual Quality	Internal IDT	Concern over the changes to visual quality in an area with heavy recreational use. <u>Resolution:</u> Project design criteria would lessen the visual impact of treatments to users on adjacent roads and trails.
Watershed/Soils, long-term soil productivity	Internal IDT	Concern over long-term soil productivity and adequate amounts of woody debris left in treatment area within the WUI units affected by the Grizzly Gulch Fire. <u>Resolution:</u> Discussed in watershed/soils section and any effects on soils and watersheds are disclosed as not significant. Project design criteria would leave additional woody debris to meet long-term soil productivity needs.

1.7 DECISION FRAMEWORK

Based on the environmental analysis in this EA, the South Dakota Field Office Manager will decide whether to implement the proposed action alternative or the no action alternative for Exemption Area Wildland-Urban Interface Project area in accordance with RMP management goals, objectives, and desired future conditions.

2 Alternatives

The analysis interdisciplinary team (IDT) used information from scoping, including the issues identified for the project (*See Chapter 1*), in conjunction with the field-related resource information, to formulate the proposed action. The proposed action and the no action alternative are presented in this EA.

2.1 ALTERNATIVES ELIMINATED FROM STUDY

2.1.1 ALTERNATIVE: USE OF PRESCRIBED FIRE ONLY

An alternative was proposed that would use only prescribed fire as a management activity to reduce the long-term fuel hazards. This alternative was considered, however the use of this alternative would not be possible on most of the BLM forested lands due to the high density of the forested stands and the high fire hazard level conditions for many of those stands. Conditions are such that the risk of a prescribed fire getting out of control was considered significant. Initial mechanical thinning and fuel reduction treatments are required before the BLM forested stands could be treated with prescribed fire safely. However, prescribed fire would be widely used to accomplish maintenance treatments in approximately 5-10 years. For these reasons, this alternative was eliminated from detailed study.

2.2 ALTERNATIVES CONSIDERED IN DETAIL

The two (2) alternatives considered in detail for this analysis are:

- | | |
|----|--|
| 1. | Alternative #1-No Action , is the baseline for comparing the other alternatives. The proposed management actions would not occur in the project area at this time, and the project area would remain subject to natural events and ongoing management activities. |
| 2. | Alternative #2-Proposed Action , is the proposal for treatments, developed to meet the purpose and need for action and accomplish the project objectives to reduce hazardous fuels and reduce the risk of wildfire to the wildland-urban interface. |

Maps of Alternative #2 are provided in [Appendix A](#). Larger-scale field maps of Alternative #2 are in the project planning record.

2.2.1 ALTERNATIVE #1-NO ACTION

This alternative represents the existing and projected future condition against which the proposed action alternative is compared. The management activities that are noted in the proposed action alternative would not occur; however, it does not preclude ongoing activities in this or other areas, or management proposals for the area at some time in the future.

Alternative #1 No Action is the same as the current fire hazard condition and a map is displayed in [Appendix A, Map A-2: Current Fire Hazard Levels](#).

2.2.2 ALTERNATIVE #2-PROPOSED ACTION

The proposed action would treat approximately **2,675⁸** acres of the Exemption Area managed by the Bureau of Land Management. The initial management objectives are to reduce hazardous fuels in the dense forested stands on BLM lands within the identified WUI's. Stands rated as high, moderate, or a low-moderate hazard would be treated to reduce the fuel hazard level to low. All management tools, including commercial thinning, noncommercial thinning, and all post-fire fuel treatments including cutting, piling, and burning of non-merchantable material, were considered in the development of the proposed action. No new permanent road construction would be needed, however some temporary roads may be needed to access some units. Some roads would require minor maintenance for use. Rights of Way across the intermingled private land holdings would be necessary before use of some roads for treatments.

Detailed color maps showing the management activities planned for the proposed action are found in [Appendix A, Maps A-3 and A-4](#). Project design criteria that are an integral part of the proposed action are described in detail in [Appendix B](#). The activities for the proposed action are summarized in [Table 4](#) and [Table 5](#), and are discussed in more detail in following sections.

Table 4: Alternative 2-Proposed Action Treatments

Fuel Treatments	Acres
Fuel treatments using a combination of commercial and non-commercial thinning	1,500
Fuel reduction using non-commercial thinning	115
Post-fire fuel reduction in the WUI's affected by the 2002 Grizzly Gulch Fire	755
Fire Containment Zone (FCZ) treatments using a combination of commercial and non-commercial thinning	305 acres * (13.0 miles)
Total BLM Acres Treated	2,675

* Acres for FCZ's are based on a variable width of the FCZ from 100-300 feet wide, depending on the site situation and topography. The average width of 200 feet is used to calculate acres of FCZ treatments.

⁸ Acres and miles of treatments are approximate based on GIS information. Actual acres treated on the ground could vary by 5-10% more or less for each category of treatment.

Table 5: Acres by Treatment, on BLM Lands in WUI's in Exemption Area.

WUI Emphasis Area	Commercial ¹ Thinning	Noncommercial ² Thinning	Post-fire ³ Fuel Treatments	FCZ ⁴ Treatments	Total Acres
1. Blacktail Gulch	0	35	0	0 acres	35
2. Deadwood North	5	10	0	25 acres (1.0 miles)	40
3. Deadwood South	0	0	440	35 acres (1.5 miles)	475
4. Deer Mountain	85	0	0	10 acres (0.5 miles)	95
5. Englewood	710	0	0	35 acres (1.5 miles)	745
6. Grizzly Gulch	0	0	185	10 ac (0.5 miles)	195
7. Nevada Gulch	700	70	0	50 acres (2.0 miles)	820
8. Peedee Gulch		0	130	20 ac (1.0 miles)	150
Treatments on BLM lands outside WUI's (FCZ's only) ⁵				120 acres (5.0 miles)	120
Totals	1,500	115	755	305 acres	2,675

¹ Commercial thinning also includes noncommercial treatments, fuels disposal, prescribed fire (Rx) fire if appropriate, on same acres.

² Noncommercial thinning also includes fuels disposal and Rx fire if appropriate, on same acres.

³ Post-fire fuel treatments are noncommercial felling of dead trees, fuels disposal, Rx fire if appropriate, on same acres.

⁴ FCZ variable widths from 100-300 feet. An average of 200 ft selected for calculation of acres. Treatments would be done using commercial thinning or noncommercial thinning, then fuels disposal methods, Rx fire if appropriate.

⁵ FCZ treatments outside the WUI's on BLM are a part of a FCZ strategy for the entire Exemption Area.

Fuel Treatments using Commercial Thinning

Stands identified as having a commercial size tree component (> 9 inches diameter) that need to be thinned would be treated initially with commercial harvest methods and then subsequent noncommercial treatments would be used to reduce hazardous fuels in the smaller noncommercial tree size component (< 9 inches diameter). Commercial harvest would thin from below, meaning that the largest trees would remain and the smaller limit of the commercial size trees (9"-12" diameter) would be removed until treatment objectives of stand canopy spacing and canopy closure are achieved. All management tools, including selling/salvage of merchantable material, and cutting, piling, chipping, mulching, and burning of non-merchantable material would be used to treat stands. Crushing, piling, chipping, mulching, and/or burning would treat post-treatment activity slash. Two options are presented for the economic analysis (See Social/Economic Section in the analysis file) for the implementation of Alternative 2. The first option assumes that the commercial product would not sell, due to market conditions and fuel reduction treatments would be implemented using only noncommercial thinning and noncommercial post-fire fuel reduction.

Specifically, fuel treatments would result in the following:

1. Thinning from below to favor larger diameter ponderosa pine trees and removing the smaller and weaker trees.

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- Reduce the canopy closure to less than 40 percent, increase the spacing between crowns to 10 to 15 feet, increase the spacing between boles to 20-25 feet, and decrease the basal area to 60-80 square feet.
2. Sustain and restore hardwood (aspen and birch) component.
 - In hardwood clumps (areas where hardwoods are the dominant species) that are approximately 1-acre or larger, remove all conifers (ponderosa pine and white spruce) inside and within 66 feet of the hardwood clump.
 3. Treat activity generated fuels and natural fuels.
 - Use whole-tree yarding when it can be accomplished without damaging the residual stand, then pile and burn landing slash, lop and hand pile slash within treatment units, and burn hand piles and other concentrations of fuel.
 4. Implement maintenance treatments to maintain fire hazard at lower levels.
 - Implement fuels reduction prescribed burns within the project area in appropriate units every 5 to 10 years.

The fuel treatments would treat the entire fuel profile on BLM lands within designated WUI Emphasis Areas to accomplish the following objectives:

- Reduction in ground fuels (litter, twigs and branches <3") by post treatment fuel treatments, including prescribed fire when appropriate.
- Increasing the average crown base height (ladder fuels) by thinning out smaller trees.
- Reduce the average crown bulk density (crown fuels) by spacing crowns of leave trees.

Prescribed Fire - Long-term Maintenance Treatments

Prescribed fire would be utilized as the primary long-term maintenance treatment for all stands treated in this proposal. Vigorous ponderosa pine reproduction is expected on all the treated stands and prescribed fire would be the primary management treatment tool to control and thin that reproduction so the treated stands do not redevelop (in 5-10 years) a dense ladder fuel condition and return to a higher fire hazard level. Prescribed fire would be implemented on a schedule of approximately a 5-10 year interval for BLM managed stands in the Exemption Area.

Fuel Treatments using Noncommercial Thinning

The same treatment objectives and methods as described above would be accomplished, however these stands have no identifiable commercial sized tree component that needs to be removed to reduce fuels. Only noncommercial treatments (hand crews, machine or hand piling, and crushing, chipping or pile burning the slash) would be used to accomplish management objectives.

Post-Fire Fuel Treatments

These treatments would occur in the WUI's affected by the 2002 Grizzly Fire, specifically the slopes above Deadwood in the Deadwood South WUI, Peedee Gulch WUI, and the Grizzly Gulch WUI. Much of this area burned with a high intensity fire that killed all the trees in the stands. Post-fire salvage of the larger, commercial trees is ongoing (Grizzly Gulch Hazard Salvage EA, July 2002), however the commercial value of some of the timber has deteriorated due to woodborers. Many areas have dense standing dead tree patches (4-10" diameter trees) that will begin to fall down in about 1-2 decades and increase long-term fuel loading.

The fuel treatment objective for the stands affected by high intensity fire are to reduce 50 – 75 percent of the dead, standing trees, in order to prevent a high hazard fire/fuels situation in the near future (1-2 decades). This would prevent a large continuous fuel bed of large size fuels in these stands in the future as the dead trees begin to fall to the ground.

Fuel treatments would be accomplished by dropping dead trees, lopping trunks into smaller pieces, and piling for disposal by pile burning in late fall and winter. These stands need to be treated in the next 5 years to reduce the long-term impacts of dead trees falling to the ground and creating a high fuel loading (and a high fire hazard level) in the future (1-2 decades).

An occasional small patch (less than 5 acres) of dead trees would be left standing to facilitate a more natural landscape appearance and not significantly hamper future fire control efforts or result in any increased fire hazard level in the future.

An alternate treatment would use prescribed fire 3 – 5 years from now as a maintenance fuel treatment where appropriate. This combination of initial reduction and follow-up fuel treatments are expected to help maintain a mosaic of fuels and vegetation across the landscape and achieve an overall protection strategy for the urban interface situation.

Fire Containment Zone (FCZ) Fuel Treatments using Commercial and Noncommercial Thinning

The FCZ's are variable width treatment buffers (100-300 feet wide), usually strategically located along an existing road, trail, or topographic feature (ridgeline) that would provide safe access to fire crews. These zones can also serve as a quick escape route for firefighters in the event that an approaching wildfire becomes a threat to firefighter safety.

A network of interconnected FCZ's was developed for the entire Exemption Area, regardless of ownership or status. A total of 78.0 miles were developed to provide an interconnected system of Fire Containment Zones within and outside of the Exemption Area. Of that, approximately 50.0 miles are within the Exemption Area boundary; however, only 13.0 miles are on land managed by the Bureau of Land Management inside the Exemption Area. The breakdown of FCZ's by miles is noted in [Table 5](#). See [Appendix A, Map A-4](#) for a map of the FCZ locations.

The fuels reduction treatments within the FCZ's would be more aggressive than the other previous fuel reduction treatments proposed above by increasing the distance between remaining tree crowns and tree boles. Treatments would be "feathered" with the more aggressive treatments starting at the FCZ center (road edge) and feathering or reducing the

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treatment intensity into the adjacent stand. The intent of the feathering is to limit the visual impacts and reduce any straight-line visual effects from the FCZ treatments. Landscape appearance within the FCZ would resemble an open, park-like stand with very light surface fuel loading.

Fire containment zones are most effective if the adjacent surrounding stands are also treated to reduce the fire hazard level. FCZ's also have to be maintained or the effectiveness is lost within a short period of time due to the vigorous tree and brush reproduction that would occur in these open areas. Prescribed fire or mechanical thinning/brushing of brush and small trees would be used on a regular interval (5-10 years) to maintain the effectiveness of the FCZ's.

Specifically, treatments in the FCZ's would result in the following:

- Favor larger diameter ponderosa pine trees.
- <40% canopy closure of tree crowns.
- 15-25' spacing between tree crowns.
- 30-45' spacing between tree boles.
- FCZ corridor still has some resemblance of a natural forest appearance, i.e. variation in spacing with tree diameter, retention of some small patches of seedling/saplings (less than ¼ acre size).

Criteria used for Selection of Fire Containment Zones:

- FCZ buffer corridor coincides with an existing barrier that can serve as a “fireline” for crews to take action to contain an approaching fire, i.e. a roadway or an area void of fuel.
- Most of the FCZ buffer corridor (90%) is accessible by vehicle (fire engine type).
- FCZ corridors exist along topographic features that support the effectiveness/success of the fuelbreak concept.
- FCZ corridors are located where usual weather pattern/events support effectiveness of fuelbreak concept and safety of crew and/or adjacent residents.
- FCZ corridor “edges” avoid mid-slope situation, i.e. related to fire behavior, defensible, and containment effectiveness.
- FCZ corridors connect with other fire containment zones or other features that can meet the fire containment concept.

Road Management Activities

No new permanent road construction would be needed to access treatment areas. Some temporary roads may be needed to access some commercial treatment units. Most roads to access commercial fuel reduction units would require temporary rights-of-way agreements to cross private lands. All roads used to facilitate the commercial fuel treatment operations would receive either pre-haul maintenance, haul maintenance, post-haul maintenance, or a combination thereof.

Project Design Criteria

Project design criteria have been incorporated into the proposed action to reduce impacts on resources. These project design criteria are the result of resource specialist recommendations and approval by the deciding official. The list of design criteria is guided by direction from the Resource Management Plan for the South Dakota Resource Area, and South Dakota Forestry Best Management Practices (BMP's). [Appendix B-1](#) presents a detailed list of the project design criteria.

Project Monitoring

Project monitoring is recommended during implementation of treatments and to validate resource effects analysis after treatments. Monitoring is suggested by resource IDT specialists and approved by the deciding official. [Appendix B-2](#) presents a detailed list of the recommended project monitoring activities.

2.3 COMPARISON OF ALTERNATIVES

This section provides a comparative summary of the alternatives. The discussions of effects are summarized from the various resource analysis reports and additional analysis information in the project record files. The tables below provide an overview comparison of information from the alternative descriptions and resource analysis as noted in the project record. A brief discussion comparing the alternatives follows the tables.

Table 6: Comparison of the Alternatives: Objectives and Treatment Activities

Project Objectives	Alternative #1 No Action	Alternative #2 Proposed Action
Reduced forest density and fuels loading (Measured in acres treated)	0 acres	2,675 acres
Reduced risk of uncharacteristically intense fire (Measured % of acres high or moderate fire hazard level)	56% H or M level	2% H or M level
Reduced risk to life, property, and natural resources (Measured % of acres in high or moderate fire hazard level)		
Increased safety to fire suppression crews (Measured % of acres in high or moderate fire hazard level) (Measured in miles of FCZ treatments)	56% 0 miles	2% 13.0 miles
Development of sustainable forest conditions (Measured in acres treated)	0 acres	2,675 acres
Restoration of natural ecological systems (Measured in acres treated)		
Project Treatment Activities	Alternative #1 No Action	Alternative #2 Proposed Action
Commercial Thinning (with additional noncommercial thinning also)	76 acres ¹	1,500 acres
Non-commercial Thinning Only	0 acres	115 acres
Post-Fire fuels treatments (Grizzly Fire affected WUI's only)	219 acres ²	755 acres
Fire Containment Zones (miles and acres)	0 miles/0 acres	13 miles/305 acres

¹ These acres are currently being treated in the Hearst WUI under the analysis for the Hearst EA.

² These acres are currently being treated under the analysis for the Grizzly Gulch Salvage EA.

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Table 7: Comparison of the Alternatives: Economic Indicators¹

Economic Costs and Revenues	Alternative #1 No Action	Alternative #2 Option #1 Noncommercial	Alternative #2 Option #2 Commercial
-Administrative costs			
Planning and Documentation	\$310,000	\$310,000	\$310,000
Sale Prep and Admin	\$0	\$250,000	\$250,000
-Fuel Treatment Costs	\$0	\$1,646,000	\$896,000
-Total Revenue	\$0	\$0	\$44,511
-Total Costs minus Total Revenue	\$310,000	\$2,206,000	\$1,411,489
-Cost per Acre of Treatment	\$0	\$824	\$527
Economic Outputs			
-Total Jobs (direct and indirect)	5	47	47
-Total Income (direct and indirect)	84,000	579,000	819,000
-CCF timber harvested	0 CCF	0 CCF	2754 CCF

¹ The economic analysis split Alternative #2 into two options, based on the success or failure of commercial bidding for this project.

Table 8: Comparison of the Alternatives: Issues

Tracking Issues and Indicators	Alternative #1 No Action	Alternative #2 Proposed Action
Cultural Resources	No effect short-term; however, adverse impacts could occur from a large, uncontrolled wildfire and suppression activities.	Effects mitigated by Project Design Criteria
Noxious Weeds	No effect in short-term; however, a large wildfire with subsequent fire suppression activities could result in a large increase in noxious weeds.	Effects mitigated by Project Design Criteria
Mickelson Trail Access	A large, uncontrolled wildfire could adversely impact recreational access to the trail	Effects mitigated by Project Design Criteria
Air Quality	A large, uncontrolled wildfire could adversely impact air quality.	Effects mitigated by Project Design Criteria
Prescribed Fire Risks	No Effect	Effects mitigated by Project Design Criteria
Private Land Trespass	No Effect	Effects mitigated by Project Design Criteria
Visual Quality	No effect short-term; however, long-term adverse impacts could occur from a large, uncontrolled wildfire.	Effects mitigated by Project Design Criteria
Watershed/Soils, long-term soil productivity	No effect short-term; however, long-term adverse impacts could occur from a large, uncontrolled wildfire.	Effects mitigated by Project Design Criteria

Table 9: Comparison of the Alternatives: Critical Elements of the Human Environment, and other Required Disclosures

Critical Element	Alternative #1 No Action	Alternative #2 Proposed Action
Air Quality	No Effect	Effects mitigated by Project Design Criteria
Areas of Critical Environmental Concern (ACEC)	No Effect	No Effect
Cultural Resources	No Effect	Effects mitigated by Project Design Criteria
Environmental Justice	No Effect	No Effect
Farmlands (Prime or Unique)	No Effect	No Effect
Floodplains	No Effect	No Effect
Invasive, Non-native Species	No Effect	Effects mitigated by Project Design Criteria
Native American Religious Concerns	No Effect	No Effect
Threatened and Endangered Species	No Effect	No Effect
Wastes (Hazardous or Solid)	No Effect	Effects mitigated by Project Design Criteria
Water Quality	No Effect	Effects mitigated by Project Design Criteria
Wetlands/Riparian Zones	No Effect	Effects mitigated by Project Design Criteria
Wild and Scenic Rivers	No Effect	No Effect
Wilderness	No Effect	No Effect
Other Required Disclosures		
Irreversible and Irretrievable Commitments of Resources	None	None

Table 10: Comparison of the Alternatives: Resources

Resources	Alternative #1 No Action	Alternative #2 Proposed Action
Forests, Fuels and Fire	No short-term impacts, but long-term impacts from potential large wildfires. Fire hazards remain high to moderate on 56% of the BLM acres in the WUI's.	Forest stand resilience and sustainability would be improved and be least likely to be affected by a large wildfire. Fuels would be lowered to a level that results in a high/moderate hazard only 2% of BLM lands in the WUI's.
Watershed	No short-term impacts, but long-term impacts from potential large wildfires	No short-term or long-term significant impacts
Recreation	No short-term impacts, but long-term impacts from potential large wildfires	No short-term or long-term significant impacts
Visuals	No short-term impacts, but long-term impacts from potential large wildfires	No short-term or long-term significant impacts
Heritage Resources	No short-term impacts, but long-term impacts from potential large wildfires	No short-term or long-term significant impacts
Wildlife species	No short-term impacts, but long-term impacts from potential large wildfires	No short-term or long-term significant impacts
Rare Plants	No short-term impacts, but long-term impacts from potential large wildfires	No short-term or long-term significant impacts
Noxious Weeds	No short-term impacts, but long-term impacts from potential large wildfires	Some short-term increases in noxious weeds. Long-term impacts should not result in any significant increases in noxious weeds.
Social/Economics	No short-term impacts, but long-term impacts from potential large wildfires	Some short-term economic gains. Long-term economic stability by having the reduced threat of large wildfires.

2.3.1 DISCUSSION: COMPARISON OF THE ALTERNATIVES

Alternative 1: No Action

Alternative 1 only results in a small amount of acres (295 acres) being treated in the identified WUI's, due to ongoing treatments on BLM lands under the Hearst Subdivision EA and the Grizzly Gulch Salvage EA. Forested stands on an additional 2,675 acres that have a high or moderate fire hazard level rating would not be treated, and the risk of a large, uncontrolled wildfire that could affect the WUI's and the lives and property within those WUI's would remain high. Stand conditions would continue to increase in tree density and fuel loads and more acres would move into the high fire hazard level. Administrative planning for the analysis would be considered a cost and only the planning process jobs would be generated.

Alternative 2: Proposed Action

Alternative 2 accomplishes all the project objectives and addresses all the project issues. Forested stands that have a high, moderate, or low-moderate fire hazard level rating would be treated. The potential risk of a large, uncontrolled wildfire would be reduced for most of the stands managed by the BLM in the project area. In turn, this would reduce the effects of wildfire on lives and property within the Exemption Area. Administrative planning for the analysis would still be considered a cost, however there would be project revenue and jobs generated.

Two options are presented for the economic analysis (See Social/Economic Section in project record files) for the implementation of Alternative 2. The first option assumes that the commercial product would not sell, due to market conditions, and fuel reduction treatments would be implemented using only noncommercial thinning and noncommercial post-fire fuel reduction. The acres treated (2,675) are identical between Option #1 (noncommercial thinning only) and Option #2 (commercial thinning on 1,500 of the 2,675 treated acres and noncommercial work on the rest). Option #1 would result in much higher average treatment costs/acre (\$824/ac.) than Option #2 (\$527/ac.). Option #1 would generate less income and the total revenue would be lower. Option #2 is the original intent of the proposed action treatments and is clearly the best outcome for the project objectives and the resulting revenues generated and jobs created.

3 Environment and Effects

This section will provide a summary of the existing condition (affected environment) for each resource area and the effects of the alternatives on each resource area. The complete analysis for each resource area and any cited reference is located in the project files.

3.1 FORESTS, FUELS, AND FIRE

3.1.1 AFFECTED ENVIRONMENT-FORESTS, FUELS, AND FIRE

The WUI emphasis areas contain land of varied topography and elevations (4,400 to 6,600 feet) with a variety of forested and some non-forested plant communities. The non-forested communities mostly occur on south facing slopes and benches throughout the project area as well as the lower elevations where forest transitions to grasslands. Ponderosa pine dominates the forested stands and occurs at all elevations, on all soil types and on all aspects, and is considered to be the climax species over much of the Exemption Area. White spruce occurs in association with ponderosa pine where temperatures are cooler and precipitation is greatest. Aspen, paper birch and bur oak are occasional components of these forested stands.

Lack of low-intensity fire disturbance has resulted in a forest structure displaying increased tree density in the overstory, abundant tree regeneration in the understory, and a buildup of ground fuels (both large diameter and litter layers). This has resulted in mid aged/sized contiguous tree stands on all aspects that are more prone to stand replacing wildfire because of increased fuel loading. Local examples of how these stand conditions can result in stand replacing fire include the 1959 Deadwood Fire and the 2002 Grizzly Gulch Fire.

Forest Stand Conditions and Fire Hazard Assessment

Forested stands in the project area were grouped into Stand Condition Groups based on similar stand attributes. Those stand attributes included: Density, Age Class, Size Class, Structural Stage, Composition, and Management Status. Detailed information on those stand attributes and how the Stand Condition Groups were developed is in the project files.

Four factors that affect fire hazard were used to determine fire hazard levels for each of the forested stands within the WUI treatment areas. The four factors used in this hazard assessment included: 1) Forest Composition and Density, 2) Ladder Fuels, 3) Surface Fuels, and 4) Slope.

Each of these factors has been assigned a point rating based on their characteristics and the degree of fire hazard contributed by that factor (Partners in Protection 1999). The point rating criteria was further refined for local conditions to more accurately assess the fire hazard. The

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total point score of the four factors was then added together to reflect a hazard level (low, low-moderate, moderate, or high) for the stand. A detailed description of the fire hazard level rating system is in the project files.

The fire hazard level by ownership/acres for each of the WUI treatment Areas is summarized in [Table 11](#) below.

Table 11: Forested Acres¹ by Fire Hazard Level and Ownership Within the WUI Treatment Areas

WUI Treatment Area	High Hazard Level			Moderate Hazard Level			Low/Moderate Hazard Level			Low Hazard Level		
	BLM Acres	Private Acres	Total High Acres	BLM Acres	Private Acres	Total Moderate Acres	BLM Acres	Private Acres	Total Low - Moderate Acres	BLM Acres	Private Acres	Total Low Acres
Blacktail Gulch	10	25	35	15	145	160	5	35	40	0	80	80
Central City	0	100	100	0	160	160	0	60	60	0	30	30
Deadwood North	5	10	15	10	100	110	0	125	125	0	110	110
Deadwood South	0	0	0	0	180	180	255	265	520	180	120	300
Deer Mountain	60	640	700	0	90	90	30	0	30	0	75	75
Englewood	585	435	1020	45	190	235	60	5	65	70	90	160
Grizzly Gulch	0	0	0	0	0	0	185	90	265	15	70	85
Hearst	0	245	245	0	185	185	0	40	40	0	30	30
Kirk	0	105	105	0	115	115	0	175	175	0	0	0
Nevada Gulch	465	325	790	180	390	570	115	245	360	20	0	20
Pedee Gulch	0	40	40	0	85	85	130	35	165	0	40	40
TOTALS:	1125	1925	3050	250	1640	1890	780	1075	1855	285	645	930

¹ All acreage figures are rounded numbers.

This information shows that approximately 64% of the WUI acres (all ownerships) are in either high or moderate fire hazard levels. In addition, it also shows that of the BLM lands within the WUI's, approximately 56% are in either high or moderate fire hazard levels.

3.1.2 ENVIRONMENTAL EFFECTS-FOREST, FUELS, AND FIRE

Alternative 1: No Action

In the short-term (less than 10 years), there would be little change in the fire hazard rating levels. Moderate and high burn intensity stands in Grizzly Gulch would begin to transition to a higher hazard level as dead trees start to fall and accumulate as down material. The majority of BLM forested stands within the WUI treatment areas would continue to be

classified at the moderate or high hazard level. [Table 12](#) notes the acres in each fire hazard level for Alternative 1-No Action for BLM forested stands in the WUI treatment areas.

Table 12: Alternative 1, Fire Hazard Level for BLM Forested Stands, all WUI Areas

Fire Hazard Level	Approximate Acres	% of Area
Low	285	12%
Low/Moderate	780	32%
Moderate	250	10%
High	1,125	46%
TOTAL:	2,440	100%

No additional fuel treatments would occur, nor would there be an opportunity for some fuel material to be removed as a commercial product. The fire hazard levels would remain high to moderate in existing stands. In the next 2–3 decades more forested stands would move into a high fire hazard level due to natural processes and succession. Direct effects include increased canopy closure, more surface fuel loading, and increased “ladder effect” stand development (vertical continuity). These fuel characteristics are conducive to wildfire growth and spread, and would produce intense heat and high mortality in vegetation/stands that historically have survived with fire. Future land management activities such as timber harvesting, thinning and prescribed fire use would become increasingly complex and costly. Other indirect effects include continued high suppression costs to control wildfires. These conditions increase the risk of a stand replacement wildfire event.

No additional fuel treatments would occur in the WUI’s affected by the recent Grizzly Gulch Fire. Some fuels have been removed through a prior salvage harvest project. The opportunity to remove additional fuels as a commercial product would not occur with this alternative. Presently, fire hazard is low in the moderate and high intensity burned areas, which occurred in a majority of the South Deadwood and Grizzly Gulch identified WUI’s. Through the course of vegetation succession, the fire hazard level would increase. Surface fuel loading would increase as the existing dead, standing fire-killed trees start to fall over. Over time, extensive portions of the landscape would have a heavy fuel loading of larger size diameter fuels, continuous over extensive portions of these WUI’s and adjoining private and city lands.

The long-term (20 years and longer) consequences of the No Action Alternative would result in an overall increase in the fire hazard levels for the project area due to:

- Increases in stand density and crown continuity.
- Reduction of the hardwood stands because of increased competition from conifers.
- Development of the understory ladder fuels into a more contiguous, multi-layered condition.
- Accumulation of large amounts of fuel on the forest floor.
- Increased mortality caused by bark beetles.

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Alternative 2: Proposed Action

A majority of the forested BLM lands within the WUI treatment areas would be treated to reduce the vegetation conditions that affect fire hazard levels. Exceptions would be some white spruce stands and low hazard hardwood stands would be left untreated if appropriate. Stands within the Grizzly Gulch burn area that have the highest density of standing dead trees (which would become a fire hazard once the trees fall down) would also be treated. [Table 13](#) notes the type of treatment, and the acres to be treated by current fire hazard level.

Table 13: Alternative 2, Treatment Prescriptions and Acres Treated by Fire Hazard Level

Treatment Prescription	Fire Hazard Level	Acres Treated	% of Hazard Level Acres Treated - BLM	% of Hazard Level Acres Treated – Project Area
Commercial Thin	High	1063	95%	35%
Noncommercial Thin	High	36	3%	1%
	Total High Treated	1099	98%	36%
Commercial Thin	Moderate	222	90%	12%
Noncommercial Thin	Moderate	26	10%	1%
	Total Moderate Treated	248	100%	13%
Commercial Thin	Low/Moderate	162	21%	9%
Noncommercial Thin	Low/Moderate	51	7%	3%
Post-Fire Fuels Treatment	Low/Moderate	569	73%	31%
	Total Low/Moderate Treated	783	100%	42%
Commercial	Low	50	18%	5%
Post-Fire Fuels Treatment	Low	163	58%	18%
	Total Low Treated	213	76%	23%

The following table lists the resulting post-treatment fire hazard levels by acres and percent for Alternative 2:

Table III-14: Alternative 2, Post Treatment Fire Hazard Level

Fire Hazard Level	Approximate Forested Acres Post Treatment - BLM	% of Forested Acres Post Treatment - BLM	Approximate Forested Acres Post Treatment – Project Area	% of Forested Acres Post Treatment – Project Area
High	24	1%	1953	25%
Moderate	6	<1%	1638	21%
Low/Moderate	1346	55%	2426	31%
Low	1058	43%	1696	22%

Following fuel treatment, ponderosa pine stands on BLM lands within identified WUI's are expected to: (1) be more open at the ground/understory level, (2) have spacing between residual trees varying from 20 – 25 feet, (3) have a crown base at a height where they would

not be ignited by a surface fire, i.e. approximately 15 – 25 feet depending on slope steepness, and (4), distance between crown canopies would be approximately 10 – 15 feet. The trees remaining after treatments would be the larger diameter, most fire tolerant trees of the stand.

The percentage of BLM ownership at the high and moderate fire hazard level would be reduced from 56% to 2% and the high risk of stand replacing wildfires would be reduced on BLM lands within the project area. Stand conditions would improve in resilience and resistance to disturbance as stand density would be reduced and residual tree vigor would be improved. A reduction in stand densities would reduce the number of contiguous acres of stands in moderate and high fire hazard levels. Specific agents or conditions negatively affecting forest health (insects and disease) would be substantially lessened as stand density is reduced to below threshold conditions.

Thinning would concentrate on the removal of weaker, smaller trees. The removal of these smaller trees mimics mortality caused by intertree competition or surface fires and concentrates site growth on dominant trees (Graham and others 1999). Intermediate commercial and noncommercial treatments would mimic historic low-severity fire regimes common to the warm, moist ponderosa pine habitat types in the Black Hills. Successional pathways would be similar to those experienced after frequent low intensity underburns, which would allow fire resistant stands to develop. Stands would also be better able to withstand the effects of wildfire, in terms of a reduction of tree stem mortality and reduced risk of stand replacement crown fire. Stand growth, yield, and condition would be improved by thinning. Thinning would increase growing space, availability of water, nutrients, and sunlight to residual trees. Thinning would allow individual trees to develop a fuller crown of foliage, which in turn would increase individual tree diameter growth, and allow trees to become more wind and snow firm, and better able to resist insect (bark beetle) attack. Thinning would sustain long-term timber yields as well as allow more silvicultural management options for the future. Thinning coupled with prescribed fire would encourage and hasten the development of fire maintained large tree size conditions.

Post-fire fuel reduction treatments would be applied to BLM lands in those WUI's that experienced a moderate or high burn severity during the Grizzly Gulch Fire and have potential of becoming a fire hazard within the next 10 years. The treatments are specifically designed to reduce the potential for long-term dead and down fuel loading that would occur in 1-2 decades as a result of the Grizzly Gulch Fire.

Fire containment zones would be created along existing roads and topographic features within the WUI treatment areas on BLM lands. Intensive thinning would be implemented in these 100-300 foot wide zones resulting in a low fire hazard level. The ability for fire suppression crews to control wildfires would be greatly improved by the FCZ's, and these fuelbreaks would also provide additional margins of safety for fire suppression crews.

3.1.3 CUMULATIVE EFFECTS-FORESTS, FUELS, AND FIRE

A detailed list of potential cumulative effects activities considered for this project is in the project files. A map showing these activities in relationship to the Exemption Area WUI project area is also found in [Appendix A: Map A-7](#).

Past Actions

Boomer Timber Sale - Black Hills National Forest.

Project implemented intermediate and regeneration treatments on approximately 600 - 700 acres southeast of the Exemption Area. Treatments removed continuous overstory canopy and ladder fuels. Expected response is increased conifer growth and conifer/hardwood regeneration in openings. Fire hazard level in treated stands is currently low or low/moderate.

Grizzly Gulch Fire – Black Hill National Forest, Bureau of Land Management and Private Lands.

Where the fire burned at a moderate or high burn severity, the continuous overstory canopy, fuel ladder was removed and the surface fuels were reduced. Hardwood species will rapidly sprout and expand into burned areas. Fire hazard level is currently low or low/moderate.

Post Grizzly Gulch Fire Salvage Cutting – Private Lands

Treatments removed dead and dying trees. These trees would have eventually become surface fuels once they fall over. Post-fire salvage treatment resulted in reduced fuels. Fire hazard is currently low or low/moderate.

Present Actions

Peak Timber Sale – Black Hills National Forest

Project is currently implementing intermediate and regeneration treatments on approximately 1,800 acres and natural fuels treatments on 400 acres south of the Exemption Area. Treatments removed continuous overstory canopy and ladder fuels. Expected response is increased conifer growth and conifer/hardwood regeneration in openings. Fire hazard level in treated stands is expected to become low or low/moderate.

Hearst Subdivision Fuels Reduction Project – Bureau of Land Management

Project is currently implementing 122 acres of fuel reduction thinning in the Hearst WUI Treatment Area. Treatments will remove continuous overstory canopy, ladder, and surface fuels. Fire hazard level in treated stands is expected to become low or low/moderate.

Post Grizzly Gulch Fire Salvage Cutting – Bureau of Land Management

Treatments removed dead and dying trees on approximately 300 acres in the Deadwood South WUI Treatment Area. These trees would have eventually become surface fuels when they fell over. Treatment has resulted in reduced surface fuels. Fire hazard in treated stands is currently low or low/moderate.

Future Actions

Elk Bugs and Fuel Project – Black Hills National Forest

Proposed treatments include intermediate and regeneration treatments on approximately 14,000 acres and natural fuels treatments on 600 acres to the east of the Exemption Area. Treatments will remove continuous overstory canopy and ladder fuels and reduce surface fuels. Expected response is increased conifer growth and conifer/hardwood regeneration in openings. Fire hazard level in treated stands is expected to become low or low/moderate.

Mineral Timber Sale – Black Hills National Forest

Proposed treatments include intermediate and regeneration treatments on approximately 2,000 acres and natural fuels treatments on 150 acres to the south and southeast of the Exemption Area. Treatments will remove continuous overstory canopy and ladder fuels and reduce surface fuels. Expected response is increased conifer growth and conifer/hardwood regeneration in openings. Fire hazard level in treated stands is expected to become low or low/moderate.

Summary of Cumulative Effects

The Exemption Area WUI Project as well as all the past, present, and future actions considered, have or will result in an overall reduced fire hazard level through a series of thinning and prescribed fire treatments by:

- Removing the continuous overstory canopy.
- Encouraging hardwood establishment.
- Removing ladder fuels.
- Reducing surface fuels.

Over time with completion of the proposed project along with past, existing and future activities, the Exemption Area would approach a more fire resistant situation. The height to base of crowns, i.e. the vertical continuity or fuel ladder effect, would be significantly lessened, reducing the likelihood of extensive, high intensity stand replacement fire behavior. There would still be fire ignitions, but the ability to manage them including immediate suppression when necessary would have increased considerably. The cumulative effect of the past, present and future projects adjacent to the Exemption Area would result in lower fire intensities, more surface spreading fire behavior and less resistance to control, allowing hand crews to be effective with direct attack tactics in containing fire spread when necessary. The long-term cumulative impacts would be significant in terms of improving forest conditions throughout the project area, the Exemption Area, and adjacent lands.

3.2 WATERSHED AND SOILS

3.2.1 AFFECTED ENVIRONMENT-WATERSHED AND SOILS

The Exemption Area has had a long history of mining activities and is extensively roaded. Until recently, the primary uses of the land in the area were mineral extraction, recreation, and some cattle grazing. The large mines in the area are almost closed and active large-scale mining has all but ceased. Several historic cultural sites occur in the area and draw many tourists during the summer season. As indicated above, the area is located in an area that has had a history of intensive mining. Approximately 85 known mines are located in the area and several are big operations with excavated hillslopes and large tailings ponds. Placer mining operations are now mostly limited to claims operated by placer mining recreationists. A large network of improved and unimproved roads has been built supporting the mining activities.

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Most of these roads on BLM lands are unimproved native surface roads. In most cases they do not appear to be delivering large amounts of sediment, as most of the road prisms appear to be fairly stable.

Most of the topography in the project area is dominated by hillslopes that have been shaped by fluvial erosion processes that in turn were influenced by the local geologic structure. Stream valley bottoms tend to be narrow with steep moderately rounded adjoining hillslopes. Elevations range from 4,400 feet where Whitewood Creek leaves the project area, to about 7,064 at Terry Peak. Slopes generally average about 15 – 40%, however there are some areas where long planar hillslopes average 40 – 60 % in steepness. Very steep or vertical sandstone bluffs are not uncommon features along the lower third of hillslopes adjacent to larger stream channels. Precipitation usually occurs as either winter snowfall or during the summer season. Average annual precipitation for Lead, South Dakota is approximately 29 inches. Most of that amount falls in the form of snowfall; however, localized summer thunderstorms can be very intense.

Stream Channels

Whitewood Creek, Deadwood Creek, Gold Run Creek, and West Strawberry Creek are the main perennial channels in the project area. Floodplain development occurs on the lower end of Whitewood Creek that runs through the north end of the project area. Otherwise, channels in the actual activity areas are generally ephemeral or perennial and tend to be steep. The larger streams in the area have all been heavily manipulated in the past with detention ponds, aqueducts, and other water diversions. Past mining activities have impacted the current form of many of the channels in the area and in some instances, channels have been filled or moved to make room for tailings materials.

Roads are also currently impacting stream channels within the Exemption Area. Most of the streams in the project area have, or in the past, have had roads located adjacent to the stream channel. There is some limited sediment delivery from native surfaced roads, but there does not appear to be a significant problem with sedimentation, as recent State DENR water quality monitoring indicates that beneficial uses are not being impacted from sediment. Stream channel function is being altered where roads fills are impinging on the flood prone zones of channels.

Water Quality

Whitewood Creek, Gold Run Creek, Deadwood Creek, and West Strawberry Creek are all listed on the State 303(d) list as being impaired. However, the latest report (State of South Dakota, 2002) indicates that except for some isolated problems, listed stream segments generally meet state water quality guidelines. There are some elevated fecal coliform levels probably attributable to the wastewater treatment plant in Deadwood, South Dakota, but all other monitored parameters indicate that beneficial uses are being supported.

Soils

Soils in the project area are derived from a variety of geologic parent materials: schist, slate, igneous intrusion, sandstone, limestone, and quartzite. The dominant soils that have resulted

from these parent materials are mostly from the Virkula Association and include the Grizzly, Vanocker, and Citadel soil types. Most of these soils have loam, silt loam, clay loams, or sandy loam textures. Soil permeability is slow to moderate and thus runoff is moderate to rapid for these soils. There are also some deep well drained loamy soils associated with the Hisega-Rock Outcrop formations. Water erosion hazards for these units are severe and slippage can occur when soils are disturbed.

Prior to the Grizzly Gulch Fire, field surveys for soil and water resources were conducted for project activities that had been planned for the area before the fire. The project area was stratified into areas of recent past management activities (soil disturbance) and proposed project activity areas. A field survey of the project area was then conducted to assess the current condition of the soil resource and whether or not a more intense field survey was warranted. The soil quality standards that were surveyed included compaction, rutting, displacement, severely burned soils, surface erosion, soil mass movement, and organic matter guidelines. The sites that have received mining and roading activities were generally all still in a heavily disturbed condition. All forested areas that were examined appear to have soils that are functioning at or near their productive capacity. Most surveyed areas had an abundance of coarse woody debris surface fuels, but there appeared to be little of the larger (12 inches and greater and 8 feet long) sizes of organic materials that play an important role in long-term soil productivity. In terms of total coarse woody debris, the area meets the recommendations found in Graham et. al. (1994).

Grizzly Gulch Fire

The Grizzly Gulch Fire burned approximately 11,000 acres and of that about 5,063 acres is within the Exemption Area ([See Appendix A, Map A-5](#)). Prior to the fire, most of the area was well vegetated with pine stands, grasses, and woody brush species. As indicated above, bare soil areas were not uncommon near bluffs and rock outcrops, but overall, ground cover was sufficient to hinder or retard the natural eroding nature of this landscape.

The portions of the project area that were affected by the fire experienced a mosaic of burn patterns and severities/intensities. In these high burn severity areas, the litter and duff were entirely consumed, little to no protective groundcover exists; and soils exhibit strong water repellency. Increased stream flows due to strongly hydrophobic conditions in high burn severity areas are reflected in the Grizzly Gulch Fire hydrologists' peak flow analysis (Grizzly Gulch BAER Report, 2002). Soils in this area have a certain degree of natural water repellency before wildfire disturbance. However, an increase in overland flow due to the fire-enhanced hydrophobic conditions is expected and is coupled with increased rates of erosion. Fire-caused hydrophobic layers typically take six months to two years to break down. Plant root development and soil microbial activity contribute to the degradation of hydrophobic conditions.

Areas of moderate burn severity exist throughout the entire fire area across all vegetation types. In these areas, some leaves or needles remain and will drop to provide protective ground cover that will help reduce runoff velocities, promote infiltration, and mitigate post-fire erosion potential. The litter and duff in these areas was consumed in discontinuous

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patches. Hydrophobicity is predominately classified as weak with inclusions of moderate and/or no repellency at the surface in areas of moderate burn severity.

Fire intensity and severity mapping conducted on the Grizzly Gulch Fire within the exemption area classified 33% of the burn as high burn intensity/severity, 28% moderate burn intensity/severity, 28% low burn intensity/severity, and 11% unburned (See Table 15).

Table 15: Burn Severity in Grizzly Gulch Fire

Burn Severity	Acres	Percent
High	1691	33%
Moderate	1405	28%
Low	1419	28%
Unburned	547	11%
TOTAL	5063	100%

Recovery of grasses, forbs, and shrubs is expected to occur in most areas within 3 to 5 years. Some high severity areas may not fully recover for ten or more years. Once the soils and vegetation have recovered the watershed is expected to return to pre-fire conditions. The grass and smaller woody vegetation types common to the project area are very conducive to quick recovery after wildfires. There were some localized areas of high burn severity. The impacts from the fire to long-term soil productivity could be substantial. The continuing recruitment of organic material is critical to the long-term health of soils and therefore to future forests. Graham (1999) writes:

“Larger fuels consisting of standing dead trees, large limbs, and down logs or coarse woody debris play critical roles in fixing and storing nitrogen (N), protecting the soil surface, and supplying organic matter to the forest floor.”

Coarse woody debris is very important due to its ability to act as a reservoir or sponge for water storage at the soil surface, its effect on stream channel stability, and also for its usefulness as habitat for some wildlife species. Coarse woody debris (dead organic material 3 inches in diameter and larger) and large woody material (a subset of coarse woody debris which includes snags and downed organic material 12 inches in diameter and larger) may be lacking in the near future. Many forested areas will have a short-term (0 – 10 years) deficit in coarse woody debris, but would have a spike in coarse woody debris and large woody material, up to an estimated 30-40 tons/acres, as dead trees fall down over the next 10 – 30 years. However, after that time, there will be very little recruitment of larger diameter organic material to the forest floor until a new forest is re-established.

Data on specific amounts of coarse woody debris and large woody material necessary for healthy forest conditions in the BLM Exemption Area was unavailable, but Graham (1994) has collected data in similar healthy dry pine types and found that they tend to have approximately 10 – 15 tons/acre of coarse woody debris. Of that amount, it is estimated that large woody material would contribute approximately 50 percent, or 8 – 10 tons/acre. Since the project is located in a frequent fire regime dry pine type, the fuel size classes that have historically provided for long-term soil productivity were probably the larger size classes that were not as easily consumed during frequent low intensity/severity fires.

Soil erosion hazard in the project area is defined as the potential for soil detachment and transport given a landscape's slope, soil erodibility, soil water-holding capacity, and precipitation pattern. It assumes no vegetation is present on the disturbance site. A "high hazard" (greater than 0.2 disturbance index) occurs where disturbance is likely to create significant soil erosion, and high-cost mitigation measures may be needed to reduce it. A "moderate" hazard (less than 0.20 and greater than 0.1 disturbance index) occurs where disturbance is likely to create significant soil erosion, but special project design criteria may be sufficient to prevent or reduce it. A "low" hazard (less than 0.1 disturbance index) occurs where significant soil erosion is unlikely even after disturbance. Soil erosion hazard is moderate in most of the survey area ([See map in project files](#)). However, the high burn severity portions of the Grizzly Gulch Fire area and the relatively small areas associated with the Hisega-Rock Outcrop formations all are rated as "high" erosion hazard. Impacted areas such as mines, road cuts, power line routes, and ski run routes were all rated as high disturbance.

3.2.2 ENVIRONMENTAL EFFECTS-WATERSHED AND SOILS

Alternative #1: No Action

The no action alternative would maintain the trend of the current condition for the watershed and soils resources. The watershed and soils conditions would continue on a slight upward trend as the project area naturally recovers from the Grizzly Gulch Fire. Impacts to water source areas from past mining activities and limited sediment delivery from rutted road conditions would continue. In the Grizzly Gulch Fire affected area there would be a short term deficit in surface organic material (0 – 10 Years), a near term surplus in 10 – 30 years, and a long period afterwards (until a new forest is re-established and coarse woody debris recruitment is occurring) where coarse woody material would be deficit in the ecosystem. As long as the Exemption Area remains at risk to high intensity/severity wildfire, long-term soil productivity will also remain at risk. A high intensity/severity wildfire could decrease the recruitment of large organic materials to the soil surface for decades into the future. The lands managed by the BLM within the Exemption Area currently have a soil disturbance rating of 87% Low Disturbance, 12% Moderate Disturbance, and 1% High Disturbance.

Alternative #2: Proposed Action

Effects on Soils

The proposed action includes a greater amount (area) of those higher impact disturbance activities (mechanical stand treatments). However, past harvest activities in the project area indicate that the soil resources recover from silvicultural activities within about 5-10 years. Non-treatment areas and precommercial areas (non-mechanical hand thinning and fuels reduction) all rated as low risk for detrimental soil disturbance. Areas rated as low risk for disturbance are expected to recover within 1-3 years. Those activities that rated as moderate risk for detrimental soil disturbance were units proposed for partial cutting or select cutting of timber stands. Areas rated as moderate risk for disturbance are expected to recover within 1 - 5 years. Commercial harvest areas, and other mechanical fuels reduction areas that would receive tractor yarding disturbance activities all rated as high potential for detrimental soil disturbance, however these areas are expected to recover within 3-10 years. All of these

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ratings consider the effect of those areas that burned and therefore the recovery times are somewhat longer than would be expected under a green watershed condition. Table 16 notes the effects of Alternative #2 on risk of soil disturbance.

Table 16: Alternative #2 Relative magnitude of Soil Disturbance ¹.

Soil Disturbance	Percent of the Activity Areas
Low	82%
Moderate	11%
High	7%

¹ Ratings of Low, Moderate, and High are based on the relative impact of the project alternative activities.

Effects on Sediment

Fuels reduction activities, aside from road building or maintenance, are not expected to deliver sediment to stream channels. All fuels reduction and road building or maintenance activities would implement BMP's as outlined in the project design criteria in [Appendix B](#). Stream buffers of at least 50 feet will also be applied to help insure that sediment delivery is minimized.

The proposed action would not construct any new permanent roads. Some temporary roads may be needed to access some units. Road maintenance activities might occur on approximately 10 miles of roads adjacent to stream channels, however this maintenance is expected to be light. Most of the roads immediately adjacent to stream channels were outslopped and very low gradient (>2% slope). According to sediment modeling utilizing the WEPP erosion prediction model, sediment delivery from roads is relatively minor (See Table 17). Most of the road segments located next to stream channels are not delivering a lot of sediment. There are some main county road segments that are delivering sediment, however the amount of sediment delivered is relatively small. The current conditions of the rest of the segments adjacent to channels are fair to good, so these road segments are not expected to produce a lot of sediment from road maintenance activities. Therefore, the volumes of sediment generated from this project should not be sufficient to degrade local or downstream channel and water quality conditions. Project road activities would contribute some sediment delivery, however the amounts of sediment are not considered significant.

Table 17: Sediment delivery from roads adjacent to stream channels

Road Activity	Road miles	Sediment Delivery (tons/year)
Existing Condition	10.3	
Non BLM Access Roads	4.0	3.1
BLM Project Roads	6.3	4.9
Alternative 2		
Non BLM Access Roads	4.0	4.8
BLM Project Roads	6.3	7.6
Sediment Increase due to road use activities	0	4.4

3.2.3 CUMULATIVE EFFECTS-WATERSHED AND SOILS

Those projects or activities that have the potential to combine with the proposed project alternatives to have a cumulative effect on the soils and watershed resources are:

- Grizzly Gulch Fire Suppression Activities (50 miles of dozer fire line)
- Hearst Fuels Reduction Project
- Grizzly Gulch Fire Salvage
- Mineral Fuels Reduction Project
- Ongoing Mine Rehabilitation Activities at the Homestake Mine in Lead
- Ongoing Ski Resort Facilities and Maintenance
- Powerline Rights of Way
- Past and Ongoing development of Commercial Properties in Deadwood

The Cumulative Effect analysis area for the Exemption Area Project includes the entire Whitewood Creek watershed upstream of the intersection of the northern boundary of the Exemption Area and Whitewood Creek. The included cumulative effects area outside of the activity units is mostly privately owned land and lands managed by the Forest Service. The lands outside of the BLM activity units are generally a mixture of forestlands intermixed with commercial properties, private residences, grazing pastures, power line rights of way, and old mine sites. The area is moderately roaded with a mixture of low standard native surface roads, graveled roads, and paved roads.

The No Action Alternative will not result in any cumulative effects. There are no activities planned for the No Action Alternative that would combine with past, present, and future activities to cause an accretion of effects on soils and watershed.

The Proposed Action would treat most of the burned and unburned stands in the BLM managed lands within the WUI's in the Exemption Area. There would be a small relatively short-to-near term (1- 10 years) cumulative effect as a result of implementing the Proposed Action. The project includes activities that would require the use of mechanical ground disturbing equipment to remove the commercial and excess fuel materials. Those activities, ie: mechanical yarding of commercial materials and extra fuels, are the primary causes of this cumulative effect, but effects of those activities should be limited in time to the short-term (1 – 3 years) and near – term (5 – 10 years). The Proposed Action does not substantially increase the risk for detrimental soil disturbance. Further, those effects will be limited to the localized area where the effects occur. And with the application of project design criteria and BMP's, these cumulative effects should not pose any long-term negative impact to the watershed. None of the impacts are expected to substantially affect stream channels where effects could be transmitted downstream and outside of the project area. Implementing the project will reduce the risk for loss of large organic material and will thereby benefit long-term soil productivity

3.3 RECREATION

3.3.1 *AFFECTED ENVIRONMENT-RECREATION*

The Wildland-Urban Interface areas included in this project are separate from each other and scattered through the landscape surrounding the towns of Lead, Central City, and Deadwood, South Dakota. Because of this scattered nature, BLM administered land assumes a supplemental role in the overall recreation activities of the Exemption Area. Having stated that, the significance of BLM and forest lands, as a backdrop to the local communities is one of the primary reasons many tourists, and thus tourist dollars, are drawn to the Black Hills and Exemption Area. Ownership of the surrounding area is inconsequential to visitors in the northern Black Hills. A forest setting is expected as a component of a good recreation experience no matter who owns or manages the land.

Residents of the towns and scattered rural residential sites throughout the Exemption Area use the public lands for various types of recreation as well. BLM has no jurisdiction over non-public lands and recreation management effects in this report are only related to BLM lands. The Resource Management Plan for the Exemption Area states management will protect the potential recreation values.

The Lawrence County economic profile identifies recreational opportunities (hunting fishing, camping, hiking, rock climbing, bike trails, gaming (also known as gambling in Deadwoods casinos), skiing, snowboarding, and snowmobiling as valuable activities that enhance the quality of life. Shopping, dining, and staying at local hotels and various accommodations are also important activities. Nearly 50 percent of the economic component of Lawrence County is made up of retail and service industries.

Within the project area specific recreation pursuits have been identified as: big game and upland bird hunting, trail use by means of off highway vehicles (OHV's), bicycles, horses, snowmobiles, skis, and foot. Additionally, residents and visitors alike enjoy sightseeing, watching wildlife, nature photography, camping, picnicking, rock hounding, and gold panning. Many of these activities take place on public land.

According to the Governor's Office of Economic Development, tourism is one of South Dakota's largest industries, generating approximately \$1.28 billion worth of economic activity each year and employing 27,500 people. Mount Rushmore, located about 30 miles from Deadwood, is South Dakota's top tourist attraction.

Annual festivals and events also attract tourists to the communities of Deadwood and Lead. Summer concert series, the Black Hills Autumn Expedition, the Festival of the Trees, and events relying on the natural environment such as the Black Hills Jeep Jamboree and the Annual Mickelson Trail Ride all draw people into the area. As these events become traditions, this will translate to sustained economic benefit to the area.

A 10.1-mile segment of the George S. Mickelson Trail and two trailheads lie within the project area. This 108-mile trail is used year round for a variety of activities including hiking, horseback riding, bicycling, cross country skiing, and some snowmobiling. It is managed by

the South Dakota Department of Game, Fish, and Parks through a right of way grant and is heavily marketed by state and local tourism offices. It is considered to be one of the premier recreation opportunities in the Black Hills.

There are no campground or picnic area facilities on BLM lands within the Exemption Area. There are however, some public campgrounds near the project area on the Black Hills National Forest and a number of privately owned and operated campgrounds in the northern Black Hills.

3.3.2 ENVIRONMENTAL EFFECTS-RECREATION

Alternative 1: No Action

The No Action Alternative would not result in any discernable change to existing recreation. However, significant impacts to recreation could happen if a large-scale wildfire were to occur due to continued build up of debris, shrubs, and trees creating excessive fuels. Depending on the scale of a wildfire, it could cause some temporary closures or inconvenience to the recreationist. In the worst-case scenario, fire and smoke damage to the towns, surrounding developments, and residents would have serious adverse impacts on this area.

Alternative 2: Proposed Action

Residents would be more aware of the temporary interruption of recreational pursuits due to project treatments, while visitors will be affected less by the inconvenience of vegetation treatment. However, the heightened concern of fire danger has created a social environment that is accepting of changes resulting from fuel reducing activities intended to reduce the risk of uncontrolled wildfires and create a safer community.

Commercial and Non-Commercial Thinning

The results of thinning will not directly affect the recreation resource. There may be some impacts, at least temporarily, to the activity of scenery viewing and access to recreation areas. In the long term, thinning should improve vistas and access.

Project design criteria are incorporated into the alternative design to minimize the negative impacts of thinning treatments to recreation. Road and trail access (especially the Mickelson Trail), and general interruptions and temporary closures due to standard logging operations need to be considered. Logging operations include dust, noise, and driving hazards due to large logging trucks and tractors; additionally, the creation of skid trails, and log landings may disrupt the recreation experience. In general, such impacts will be short-term during the times that harvest activities are taking place. These impacts would be minimized through the project design criteria for recreation noted in [Appendix B](#).

Fire Containment Zone Fuel Treatments

These areas are treated more aggressively, removing more timber and will result in more open views below the forest canopy along roads. Benefits, detriments, and project design criteria would be similar to those discussed in the thinning section above.

Post Fire Fuel Treatments

Because of the disturbed condition of this landscape, located primarily within the Grizzly Gulch Fire area, the primary recreation activity that occurs here, on a minimal level, is hunting. Reducing existing hazards such as dead standing trees that are subject to disease or toppling by unstable root systems, and taking measures to improve the environment by erosion control methods, as well as facilitating new growth will all benefit future recreational opportunities in this unit.

Prescribed Fire

The primary short-term effect on scenery and recreation from burning is smoke and poor air quality. A longer-term effect is the view of a burned landscape.

3.3.3 CUMULATIVE EFFECTS-RECREATION

Due to the localized nature of the proposed fuel reduction treatments and the clear identity of recreation in the local area, the recreation resource cumulative effects area is the main highway corridor of Lead/Deadwood in the Exemption Area. The direct effect on recreation will be a short-term interruption of some recreation activities. The fuel reduction treatments will improve the over all health of the forest and safety from wildfire, thereby improving recreation opportunities in the future. People familiar with the area, especially the residents in the treatment areas, will be more aware of limited recreation activities during fuel treatments. Visitors and tourists will be less aware of change. Because of the heightened awareness of fire danger in the community, interruptions to recreation, even those noticeable in the short term, will be more acceptable.

Reasonably foreseeable actions, including future prescribed burning, brush disposal, and additional thinning at 7-10 year intervals are believed to be in concert with the proposed action. The proposed action would have little or no cumulative impact on recreation with these actions. The complete recreation resource analysis is in the project files and project design criteria for the recreation resource are in [Appendix B](#).

3.4 VISUAL RESOURCES

3.4.1 AFFECTED ENVIRONMENT-VISUAL RESOURCES

The Wildland-Urban Interface areas included in this project are separate from each other and scattered through the landscape surrounding the towns of Lead, Central City, and Deadwood, South Dakota. These towns have considerably different characters; Lead is a mining community trying to adapt to a future of economic change from the closure of Homestake mine while Deadwood, a National Historic Landmark, has been developed as a destination gaming and entertainment center serving a regional population. Central City is very small and mostly residential. The viewing scenery in the Exemption Area encompasses private, state, and other lands in conjunction with the public lands since boundaries are indistinct or absent. While meaningful application of visual assessment references all visible landscapes, BLM has no jurisdiction over non-public lands. Activities related to visual resources in this project only apply to BLM lands. The Resource Management Plan for the Exemption Area states that

surface disturbing activities will be designed to minimize impacts on visual resources. Treatments should not have an adverse long-term visual impact to the Deadwood National Historic Landmark.

There are eleven Wildland-Urban Interface areas, of which four have been evaluated in the Visual Management Resource (VRM) system. Deadwood South, Deer Mountain, Nevada Gulch, and Englewood have interim VRM classes and objectives assigned to them. The evaluation documents are in the project files. The remaining areas are addressed in several ways. The Grizzly Gulch and Peedee Gulch areas are contiguous with Deadwood South and contain the same physiographic features and have been affected by the recent Grizzly Gulch Fire and subsequent salvage operation. They have limited BLM acreage and are not assessed in detail although the surrounding lands have been reviewed and a general visual assessment was made. Kirk and Central City WUI areas have no BLM lands and Hearst area is not proposed for further activity. Discussion about visual quality would apply to these areas but they are not individually assessed.

3.4.2 ENVIRONMENTAL EFFECTS-VISUAL RESOURCE

Alternative 1: No Action

Regarding all Wildland-Urban Interface Areas including the unburned areas of South Deadwood, Grizzly Gulch and Peedee Gulch:

The No Action Alternative would result in little perceived change for many years. If no disturbance events occur over the next 50 to 100 years, ponderosa pine and spruce would continue be the dominant elements in the landscape, further reducing scenic variety and heightening fire risk to area residents. Additionally, taking no action would have little visual effect in the short term. If a large-scale wildfire were to occur because of continued build up of vegetative fuels, the visual effect would be that of a high intensity, stand replacing fire. Fire damage to the towns and other surrounding developments would be devastating in other ways than visually. In the No Action alternative, the vegetation will continue to become more homogenous, reducing variety in type and structure. This decreases the value of the visual resource over time.

Regarding the burned areas of South Deadwood, Grizzly Gulch and Peedee Gulch WUI's:

Fire in these WUI's has the potential to create a desirable appearance, as larger ponderosa pine trees remain standing, a mosaic of age classes survives, and openings are maintained. This has actually occurred in these areas from fires in the past. However these positive results are achieved over a great length of time and the scenic result at any given time is subject to multiple variables. The outcome could be desirable, or, additional impacts stemming from the initial entry of fire such as insect infestation, wind throw or additional burning can cause continuing disruption of the scenic quality.

The existing low scenic integrity of the crown fire burned areas does not meet the class two visual objectives. Taking no action will keep the site outside the parameters of that visual class, and the blackened, scorched trees will be seen for many years. Numerous seasons of plant growth will eventually restore a natural appearing landscape, but it could take decades for the ponderosa pine to regenerate into mature stands. This area will be change whether or

not management occurs. The time for a forest to attain a natural appearance can be shortened with active management. The openings created by dead and damaged trees add diversity of a sort to roadside viewing but the increased disturbance caused by an abundance of fallen trees and other debris offsets this potential benefit.

Alternative 2: Proposed Action

The forests in the Exemption Area often appear natural to the casual observer yet are in many places densely stocked and contain unnatural accumulations of surface fuels. The visual changes resulting from the treatments proposed will be short-term and perceived primarily in foreground, less perceptible from middle ground and imperceptible from background views. In the long term, the results will not only be imperceptible visually but will create a more sustainable scenic environment because the forest will not be as vulnerable to drastic change from fire. People familiar with the area, such as adjacent rural residents, will be more aware of the activities and visual alteration. Urban residents and visitors will likely not be aware of the change. The heightened concern for fire danger has created a social environment more accepting of visual changes resulting from fuel reducing activities to create a safer urban interface environment. The proposed treatments are designed to take visual diversity and scenic appeal into account.

Commercial Thinning [Deer Mountain, Englewood, Nevada Gulch WUI's]

Treatments as proposed for commercial thinning in these units will result in a natural appearing ponderosa pine and/or spruce forest. Commercial thinning that accentuates the desired characteristics such as large trees and clusters of aspen and birch create diversity and a natural appearing view. Additional characteristics such as irregular edges, openings and clumps (1-5 trees as cited in the treatment description) would further the visual diversity in these areas.

In general, such impacts would be short-term viewed from the foreground during treatments. The impacts would be minimized through the avoidance of tractor yarding over the existing road banks, restoring all contours from landing or decking areas to a naturally appearing shape, and revegetating disturbed areas with native vegetation.

Non-Commercial Thinning [Nevada Gulch, Deadwood North, Blacktail Gulch WUI's]

Treatments as proposed for non-commercial thinning in these units will result in a natural appearing ponderosa pine forest. Thinning that accentuates the desired characteristics such as large trees and clusters of aspen and birch create diversity and are naturally appearing. Additional characteristic of irregular edges, openings, and clumps (1-5 trees as cited in the treatment description) would add to visual diversity in these areas.

Fire Containment Zone Fuel Treatments

Those areas treated more aggressively by removing more timber, will open views along the roads and, if performed as proposed, will reach an acceptable visual condition. A road would result in an accentuated straight edge if it were used as the alignment for the cutting. Scalloping and feathering along landscape edges is recommended to vary the visual effect, and to avoid unnaturally appearing straight lines.

Post Fire Fuel Treatments [Deadwood South, Grizzly Gulch, Peedee Gulch WUI's]

Removal of dead and dying trees and retaining groups of trees will make this landscape more appealing and will improve scenery from the visually sensitive highway corridors and views from Deadwood. Overall, any reduction in the black, scorched trees will improve the scenery.

3.4.3 CUMULATIVE EFFECTS-VISUAL RESOURCE

The scenic resource cumulative effects area is determined to be the Exemption Area. The visual effects will be short-term and will be perceived as primarily in the foreground. The fuel reduction treatments will be less perceptible from middleground and imperceptible from background views. People familiar with the area, especially the residents in the treatment areas, will be more aware of the activities and visual alteration to the landscape. Residents in the towns and visitors/tourists will be less aware of change. Because of the heightened awareness of fire danger in the community the visual effects, even those noticeable in the short term will be more acceptable.

Reasonably foreseeable actions, including future prescribed burning, brush disposal, and additional thinning at 7-10 year intervals are believed to be in concert with the proposed action. The proposed action would have little or no cumulative visual impact with these actions.

The treatment of slash within the project area will have a cumulative effect of decreasing beetle populations in forest areas where *Ips* beetle habitat exists. As stated in the project design criteria section, some material can be crushed and spread as long as it appears similar to natural ground cover.

3.5 HERITAGE RESOURCES

3.5.1 AFFECTED ENVIRONMENT-HERITAGE RESOURCES

Historic mining and related activities dominate the landscape of the BLM Exemption Area. In the past 100 plus years the landscape of the analysis area has been dramatically altered by human activities including; mining, fire suppression, logging, road building, ranching, farming, and recreation uses. These activities contributed to the present condition of the landscape and threaten the condition of all heritage resources. The high risk of wildfires in the project area can quickly and adversely effect sites that contain wood and other consumable/flammable materials. Most of the recorded archaeological sites on public lands within the analysis area are heavily wooded.

The Black Hills have cultural and religious significance to Americans Indians. People continue to use the Black Hills for cultural, religious, and plant collection activities. In particular, the Great Sioux Nation hold the Black Hills of South Dakota to be sacred.

Historical sites are particularly abundant in the analysis area, while few prehistoric sites have

been found. This area of the Black Hills has been a center for mining activities for the last 130 years. The Exemption Area surrounds the mining towns of Lead and Deadwood, South Dakota. Several historic mines, including Homestake and Belle Eldridge are near or within the analysis area. Associated activities with the mines include mining camps, test pits, adits, railroads, houses, ditches, and at least one pipeline. Hundreds of mining prospect pits and test trenches are scattered across the analysis area.

Heritage Resources were identified as a concern during the Exemption Area Wildland-Urban Interface analysis. Three hundred forty five (345) acres had previous field surveys. The remaining area to be surveyed included ~2300 acres. Of that, 760 acres were pedestrian surveyed at 100%. The remaining areas are on slopes of 30% or greater and were reconnaissance surveyed as per agreement with the South Dakota State Historic Preservation Office (Hoskinson, 2000). There remain approximately 50 acres to be surveyed prior to Fire Containment Zone (FCZ) treatments.

3.5.2 ENVIRONMENTAL EFFECTS-HERITAGE RESOURCES

Alternative 1: No Action

If there is no federal action, then there is no undertaking, as defined in 36 CFR 800.2, for Section 106 of the National Historic Preservation Act (16 U.S.C. 470f). The No Action Alternative could produce effects on the Historic Properties in the analysis area as well as the historic communities of Deadwood (National Historic Landmark) and Lead. Large fuel loads increase the odds of a catastrophic wildfire threatening Historic Properties. If nothing is done to reduce these risks, these properties are vulnerable to modification and/or destruction by wildfire.

As demonstrated by the Grizzly Gulch Fire that recently swept through a portion of the analysis area, the result of no action can be severe. Six (6) of the newly recorded archaeological sites have already been exposed to catastrophic wildfire. These sites had significant alterations due to the Grizzly Gulch Fire (Grizzly BAER Report 2003).

Alternative 2: Proposed Action

According to the 2001 revised regulations [36 CFR 800.4(d)(1)] for Section 106 of the National Historic Preservation Act (16 U.S.C. 470f) the determination for the proposed action is that no historic properties would be affected.

Twenty-two (22) sites are recorded within the analysis area. Nine (9) of these are not considered eligible for listing on the NRHP. Under the implementing regulations of Section 106 of the National Historic Preservation Act (36 CFR 800), sites not eligible for listing on the NRHP are no longer considered. The remaining thirteen (13) sites are either eligible, or potentially eligible for listing. These thirteen (13) sites will be avoided during the proposed undertaking. Additional required survey of 50 acres within certain proposed FCZ(s) will identify, evaluate, and avoid any newly recorded Historic Properties, or if adversely effected, will require additional consultation with SHPO and concerned Tribal representatives.

The reduction of flammable materials so wildland fires burn less intensely indirectly protects sites by preventing high intensity fires from destroying these non-renewable resources. Unanticipated and indirect impacts from the proposed action may include the destruction of archaeological contexts due to erosion created from thinning activities. Stipulations placed in contracts and permits will require notifying BLM of unanticipated finds.

If the recommended project design criteria and monitoring are followed, there are no anticipated adverse effects to Historic Properties. BLM considers a finding of *no historic properties affected* to be appropriate for this undertaking. Fifty acres of additional survey and a supplemental Class III investigation report will be required before specific FCZ's can be constructed on public lands. With final SHPO consultation, the undertaking should be allowed to proceed as planned without any additional cultural investigations as the project complies with Section 106 of the National Historic Preservation Act.

3.5.3 CUMULATIVE EFFECTS-HERITAGE RESOURCES

The loss of archaeological resources has happened in the past and will happen in the future. The cumulative effect is that, over time, fewer archaeological resources will be available for study and interpretation. During this project, the loss is limited to sites now considered not very important, or the effect is considered to not affect those characteristics of a site that make it important. In addition, the effects are mitigated by recording and archiving basic information about each site for future reference. The project complies with Section 106 of the National Historic Preservation Act.

3.6 WILDLIFE

This wildlife analysis will cover Threatened, Endangered, and Sensitive wildlife species. The analysis will disclose all expected direct, indirect, short- and long-term, and cumulative effects/impacts to all species fitting into one of the mentioned groups with habitat or documented sightings within the project area. If any potential effects would be expected with implementation of any alternative to any Threatened or Endangered species, a separate Biological Assessment (BA) will be completed with a summary of findings within this section. A Biological Evaluation (BE) covering the sensitive species was completed and is summarized in this section. The complete BE document is found in the project files.

3.6.1 AFFECTED ENVIRONMENT-WILDLIFE

[Table 18](#) and [Table 19](#) display the Federally listed and proposed species, and BLM Sensitive Species. These tables also indicate whether the species is likely to have habitat within the project area for some portion of its life cycle. Sensitive species that do not exist, do not contain habitat within the project area, or could not be impacted by the proposed activities in any way, will not be discussed further in this document, because no impacts (including cumulative) would occur as a result of implementing any alternative.

Exemption Area WUI Project

The U. S. Fish and Wildlife Service list of endangered and threatened species for South Dakota (<http://southdakotafielddoffice.fws.gov/endsppbycounty.htm>) was revised on February 6, 2002. The list for Lawrence County includes the bald eagle, whooping crane, and black-footed ferret. The bald eagle and whooping crane have been documented to occur within the county during one or more portions of their life cycles.

Table 18: Threatened, Endangered, or Proposed Wildlife Species Considered for Analysis

Species	Suitable Habitat within Project Area	Species Documented within Cumulative Effects Area	Comments
Bald Eagle	No	No	Although this species is known to occur within the county, the project area is well outside suitable habitat for this species.
Whooping Crane	No	No	Although this species is known to occur within the county, the project area is well outside suitable habitat for this species.
Black-footed Ferret	No	No	The project area is well outside suitable habitat for this species.

Table 19: Sensitive Species Considered for Analysis

Species	Suitable Habitat in Project Area	Species Documented in Cumulative Effects Area	Comments
Baird's Sparrow	No	No	
Black-backed Woodpecker	No	No	
Black Tern	No	No	
Boreal Owl	No	No	
Burrowing Owl	No	No	
Canvasback Duck	No	No	
Columbian Sharp-tailed Grouse	No	No	
Common Loon	No	No	
Dickcissel	No	No	
Ferruginous Hawk	No	No	
Flammulated Owl	No	No	
Great Gray Owl	No	No	
Hairy Woodpecker	Yes	No	Common species found throughout the Black Hills.
Harlequin Duck	No	No	
LeConte's Sparrow	No	No	
Loggerhead Shrike	No	No	
Long Billed Curlew	No	No	
Northern Goshawk	Yes	Yes	Known active nests within 4 miles of the project area.
Peregrine Falcon	No	No	
Pileated Woodpecker	No	No	
Sage Grouse	No	No	
Sage Sparrow	No	No	
Swainson's Hawk	No	No	

Table 19: Sensitive Species Considered for Analysis

Species	Suitable Habitat in Project Area	Species Documented in Cumulative Effects Area	Comments
Three-toed Woodpecker	Yes	No	Known occurrences within 2 miles of the project area.
Trumpeter Swan	No	No	
White-faced Ibis	No	No	
Black-tailed Prairie Dog	No	No	
Fisher	No	No	
Meadow Jumping Mouse	No	No	
Merriam's Shrew	No	No	
North American Wolverine	No	No	
Northern Bog Lemming	No	No	
Preble's Shrew	No	No	
Pygmy Rabbit	No	No	
Spotted Bat	No	No	
Eastern Spotted Skunk	Yes	No	No known occurrences within the Black Hills.
Swift Fox	No	No	
Townsend's Big-eared Bat	Yes	No	Known occurrences within 1 miles of the project area.
White-tailed Prairie Dog	No	No	
Woodland Caribou	No	No	
Snapping Turtle	No	No	
Spiny Softshell Turtle	No	No	
Canadian Toad	No	No	
Coeur d'Alene Salamander	No	No	
Spotted Frog	No	No	
Tailed Frog	No	No	
Wood Frog	No	No	
Arctic Grayling (fluvial)	No	No	
Blue Sucker	No	No	
Northern Redbelly X Finescale Dace	No	No	
Paddlefish	No	No	
Pearl Dace	No	No	
Shortnose Gar	No	No	
Sicklefin Chub	No	No	
Sturgeon Chub	No	No	
Westslope Cutthroat Trout	No	No	
Yellowstone Cutthroat Trout	No	No	

3.6.2 ENVIRONMENTAL CONSEQUENCES-WILDLIFE

Implementation of Alternative 2 would be the preferred alternative for the wildlife resource. It would be expected to have the least amount of long-term adverse impacts and provide the most beneficial long-term habitat improvements of all the alternatives brought forward.

Exemption Area WUI Project

Alternative 1 would be expected to have more adverse impacts than Alternative 2 because of the risk of stand-replacing wildfire activities across the area.

No Federally listed Threatened, Endangered, or Proposed species are expected to be affected (including cumulative impacts), from full implementation of the proposed action alternative, because there is no habitat present within the project area or area of influence.

Four (4) of the 57 Montana-Dakota BLM Sensitive Species (Table 20) would be expected to have some adverse impacts to individuals or their habitat with implementation of the proposed action alternative. These alternatives may impact individuals or habitat, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species for hairy woodpecker, northern goshawk, three-toed woodpecker, or Townsend's big-eared bat. The remainder of the Sensitive Species are expected to have no impact from implementation of the proposed action alternative, primarily because habitat does not exist within the project area or area of influence.

Table 20: Effects on Wildlife Species

List of all Special Status Species that are known or suspected to occur in Montana or the Dakotas.	Current Management Status of the Species.	Does the species occur on this portion of the Field Office?	Is the species or its habitat found in the greater Affected Area?	Could this proposal have any effect?	Are Irreversible or Irretrievable Resources involved?	Alt 1 level of effect	Alt 2 level of effect
Hairy Woodpecker	Sensitive	Yes	Yes	Yes	No	MIH	MIH
Northern Goshawk	Sensitive	Yes	Yes	Yes	No	MIH	MIH
Three-toed Woodpecker	Sensitive	Yes	Yes	Yes	No	MIH	MIH
Eastern Spotted Skunk	Sensitive	No	No	No	No	NI	NI
Townsend's Big-eared Bat	Sensitive	Yes	Yes	Yes	No	MIH	MIH
NI - No Impact MIH - May Impact individuals or Habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.							

3.6.3 CUMULATIVE EFFECTS-WILDLIFE

Incremental adverse cumulative impacts are expected for the four species noted above, due to the inclusion of an unknown number of ongoing and foreseeable future projects on private lands and several large vegetation projects on Forest Service managed lands. Project design criteria would prevent any substantial adverse long-term, short-term, or cumulative impacts to all species with implementation of Alternative 2.

3.7 RARE PLANTS

3.7.1 AFFECTED ENVIRONMENT-RARE PLANTS

No Sensitive or Watch Lists for plants have been established for the South Dakota Field Office, including the Exemption Area project. Therefore, there are no BLM designated Sensitive or Watch list plant species or community types considered in the rare plant section for the Exemption Area or the Exemption Area WUI project. In addition, there are no Listed Threatened, Endangered, or Proposed plant species noted by the USFWS for this area.

However there are documented rare plant populations within the Exemption Area and on BLM surface ownership that are tracked by the South Dakota Natural Heritage Program (SDNHP). This program is part of the South Dakota Game, Fish, and Parks Department, and the list of plant species tracked is titled “*Rare, Threatened, and Endangered Plant Species, April 2002.*”

Table 21 displays the list of rare plant species tracked by the SDNHP and documented either within the general Exemption Area or on BLM surface within the Exemption Area. A map showing the documented locations for rare plants in the Exemption Area is in the project files. Those species that have documented sites on BLM surface within the Exemption Area WUI treatment units will be discussed for full disclosure of the effects of the project on any noted rare plants.

Table 21 Rare Plants tracked by SDNHP within Exemption Area Project.

# sites in Exemption Area	On BLM Surface in WUI Treatment Areas?	Scientific Name	Common Name	USFS Status ¹	Global Rank ²	State Rank ³
1		<i>Asplenium viride</i>	Green Spleenwort		G4	S2
1		<i>Astragalus americanus</i>	Rattlepod		G5	S3
1		<i>Carex capillaris</i>	Hair Sedge		G5	S3
1		<i>Carex concinna</i>	Low Northern Sedge		G4G5	S3
2		<i>Corallorhiza trifida</i>	Pale Coral-Root		G5	S2
1		<i>Elymus diversiglumis</i>	Interrupted Wildrye		G3?Q	SU
2		<i>Listera convallarioides</i>	Broad-Lipped Twayblade		G5	S1
1		<i>Luzula acuminata</i>	Hairy Woodrush		G5	SU
2		<i>Luzula parviflora</i>	Small flowered Woodrush		G5	SU
1		<i>Petrophyton caespitosum</i>	Tufted Rockmat		G4	S4?
6	Yes (3)	<i>Pyrola picta</i>	White-Veined Wintergreen		G4G5	S2
2		<i>Pyrola uniflora</i>	One-Flower Wintergreen		G5	SU
1		<i>Salix lucida</i>	Shining Willow		G5	S1
1		<i>Sanguinaria canadensis</i>	Bloodroot	BHNF-S	G5	S4?
2		<i>Saxifraga occidentalis</i>	Western Saxifrage		G5	S2
1		<i>Solidago sparsiflora</i>	Three-Nerved Goldenrod		G5?	SU
4		<i>Sorbus scopulina</i>	Western Mountain Ash		G5	S4?
11	Yes (3)	<i>Vaccinium membranaceum</i>	Mountain Huckleberry		G5	S2
1		<i>Viola selkirkii</i>	Great-Spurred Violet	BHNF-S	G5?	S1

Exemption Area WUI Project

Table 21 Rare Plants tracked by SDNHP within Exemption Area Project.

# sites in Exemption Area	On BLM Surface in WUI Treatment Areas?	Scientific Name	Common Name	USFS Status ¹	Global Rank ²	State Rank ³
¹ USFS status= species status as a Sensitive Species for the Black Hills National Forest						
² Global Ranks are defined below.						
³ State Ranks are defined below.						
Global/State Rank Definition (applied rangewide for global rank and statewide for state rank)						
G1 S1 Critically imperiled because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.						
G2 S2 Imperiled because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.						
G3 S3 Either very rare and local throughout its range, or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extinction throughout its range because of other factors; in the range of 21 of 100 occurrences.						
G4 S4 Apparently secure, though it may be quite rare in parts of its range, especially at the periphery. Cause for long-term concern.						
G5 S5 Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery.						
GU SU Possibly in peril, but status uncertain, more information needed.						
GH SH Historically known, may be rediscovered.						
GX SX Believed extinct, historical records only.						
G? S? Not yet ranked						
? _ ? Inexact rank						
_ Q Taxonomic status is questionable, rank may change with taxonomy						

3.7.2 ENVIRONMENTAL EFFECTS-RARE PLANTS

No Action Alternative (Alternative 1)

There are no BLM designated Sensitive or Watch list plant species or community types considered in the rare plant section for the Exemption Area or the Exemption Area WUI project. In addition, there are no Listed Threatened, Endangered, or Proposed plant species by the USFWS for this area. Therefore, no impacts will occur on any BLM TES/Watch List plant species under the No Action Alternative (Alternative #1).

No adverse direct, indirect, or cumulative effects would occur on any SDNHP rare plant species from the No-Action alternative. No ground disturbing activities would occur; however, existing and ongoing uses of the project area would still occur, including recreation, grazing, firewood cutting, and many other uses. Although the effects of the 2002 Grizzly Gulch Fire on rare plants is unknown, it is probable that without fuel reduction treatments and in the event of another large stand replacing wildfire, adverse impacts could impact native plant populations and communities, including rare species, through soil, habitat, and watershed damage that could occur from a large wildfire.

Alternative #2

There are no BLM designated Sensitive or Watch list plant species or community types considered in the rare plant section for the Exemption Area or the Exemption Area WUI project. In addition, there are no Listed Threatened, Endangered, or Proposed plant species by the USFWS for this area. Therefore, no impacts will occur on any BLM TES/Watch List plant species under Alternative #2.

The proposed activities of fuel reduction treatments would not likely impact known sites for the following SDNHP rare plant species: white-veined wintergreen (*Pyrola picta*) and mountain huckleberry (*Vaccinium membranaceum*). Both of these species are found in moist, shaded mixed-conifer sites close to riparian zones or in lower slope positions. A limited amount of spruce stands are being treated under this proposal and riparian areas are given at least a 50-foot buffer. Some pine will be removed out of upland hardwood stands, however, overall the proposed treatments are focused on the dry ponderosa pine stands at mid and upper slope positions. Therefore, the project fuel reduction activities should have a very minimal impact on *Pyrola picta* and *Vaccinium membranaceum* and potential habitat for those species.

3.7.3 CUMULATIVE EFFECTS-RARE PLANTS

No cumulative effects would occur on any TES or Watch List plant species tracked by the BLM. Impacts from the project activities on SDNHP rare plants are considered to be none to very minor. Projects adjacent to the Exemption Area on the Black Hills National Forest (Minerals Project, Elk Bugs Project) have intensive rare plant surveys conducted by Black Hills National Forest, and rare plants tracked by the BNHF would be protected with project design criteria for those projects. Therefore, no cumulative impacts should occur.

3.8 NOXIOUS WEEDS

3.8.1 AFFECTED ENVIRONMENT-NOXIOUS WEEDS

Currently, the information on noxious weeds in the Exemption Area project is limited, however previous field surveys have identified the presence of the following noxious weed species (See Table 22) on or adjacent to BLM lands in the Exemption Area⁹. No estimates or actual acreages of noxious weed infestation on BLM lands are available. In addition, the Black Hills National Forest (BHNF) has documented infestation areas close adjacent to the Exemption Area for several noxious weed species (see gis map is in the project files).

Table 22: Noxious Weed Species of Concern for Exemption Area

Scientific Name	Common Name	Reported BLM Presence?	Reported BHNF Presence?
<i>Cardus nutans</i>	Musk Thistle	No	Yes
<i>Centaurea maculosa</i>	Spotted Knapweed	No	Yes
<i>Cirsium arvense</i>	Canada thistle	Yes	Yes
<i>Cynoglossum officinale</i>	Hound's-tongue	Yes	Yes
<i>Euphorbia esula</i>	Leafy spurge	Yes	Yes
<i>Hypericum perforatum</i>	St. Johnswort	Yes	Yes
<i>Linaria dalmatica</i>	Dalmatian toadflax	No	Yes

⁹ Grizzly Gulch Fire-Hazard Tree and Salvage EA, July 29, 2002.

Table 22: Noxious Weed Species of Concern for Exemption Area

Scientific Name	Common Name	Reported BLM Presence?	Reported BHNH Presence?
<i>Linaria vulgaris</i>	Yellow toadflax	Yes	No
<i>Tanacetum vulgare</i>	Tansy	Yes	Yes
<i>Verbascum thapsus</i>	Mullein	Yes	No

The project area is a mix of private and BLM lands with multiple human disturbances from the long history of mining and other human activities. The area has long been heavily impacted by human activities and this creates an environment for the introduction and spread of noxious weeds. The most abundant and widely distributed noxious weed species for the project area is Canada thistle. Canada thistle usually occurs along roads, around range improvements, dry meadows and in many other types of disturbed sites. Not as abundant but also widespread is common tansy, which is usually found along the edges of riparian zones or along roadsides in more moist conditions than many noxious weeds. Of high concern is a documented infestation of spotted knapweed that is about 5 miles east of the project area on private lands and National Forest lands. Spotted knapweed is a very aggressive weed that will infest large acreages along road systems very quickly. In addition, documented infestations of leafy spurge are located to the north and south of the Exemption Area. Leafy spurge is an aggressive weed of rangelands, dry meadows, and riparian zones.

Ongoing control of noxious weeds is accomplished by a cooperative approach between the Bureau of Land Management and local County weed boards. There is currently an agreement in place between the Bureau of Land Management and Lawrence County to control noxious weeds using chemical, mechanical, and biological control measures. These Integrated Pest Management practices are implemented to reduce the risk of new noxious weed infestations and control existing noxious weed populations.

Grizzly Gulch Fire: changes in noxious weed affected environment

For most noxious weed species identified in the Exemption Area project, disturbed sites and dry potential vegetation types are the most at risk from invasion and spread. Disturbed areas would be roads, gravel pits, dispersed recreation sites, and where ground disturbing fire suppression actions occurred (dozer lines, hand lines, helispots, safety zones, and drop points). Burned sites can have altered soil structure and reduced organic matter content creating a more favorable germination substrate for weed seeds. Finally, undisturbed areas in drier vegetation types are also at risk. This is because many of our noxious weed species have evolved in dry Mediterranean climates and are highly competitive under similar site conditions.

The Grizzly Gulch Fire and the subsequent fire suppression, the Burned Area Emergency Rehabilitation (BAER) activities, and the post-fire salvage activities has likely increased the acres of existing populations of noxious weeds and could have introduced new species of noxious weeds to the project area. Limited information is available on Grizzly Gulch Fire

post-fire noxious weed surveys or monitoring, however monitoring is planned in coordination with Lawrence County in 2003.

3.8.2 ENVIRONMENTAL EFFECTS-NOXIOUS WEEDS

Alternative 1: No Action

Noxious weeds are spread through normal dispersal methods and also by ongoing human activities such as hunting, grazing, firewood cutting, and other uses of the public and private lands. All these activities would continue, and contribute to the spread of noxious weeds of all the current species and possibly introduce new species. There could be an increase in acres infested by noxious weeds even under the No Action Alternative due to ongoing uses of the project area. Ongoing noxious weed control efforts by the BLM, USFS, and Lawrence County should help to limit the spread of existing infestations and any new infestations of noxious weed species.

Alternative 2: Proposed Action

Activities proposed in the proposed action alternative would likely result in a short-term increase in noxious weeds acres of all known species and could introduce new noxious weed species to the area. Activities proposed in this project would introduce vehicles and equipment use into areas and create more disturbed soils. Contractors bringing in equipment from other areas have the potential to introduce new infestations of noxious weed species and expand areas of existing infestations.

Noxious weeds have the potential to increase on approximately 1,500 acres proposed for commercial fuel reduction treatments, along existing roads used for access, and the approximately 13.0 miles of FCZ treatments. The actual acres of noxious weed increases that may occur from the proposed action fuel treatment activities is not known, however the potential for an increase in noxious weeds is highly probable, due to the existing populations of noxious weeds that are currently in the project area.

A recent monitoring study done on the Black Hills National Forest noted that noxious weeds increased an average of 3% of the ground-disturbing activities such as logging, burning and road construction.¹⁰ If the figure of 3% is used for this project area, that would result in an estimated 54 acres¹¹ of potential new noxious weed infestation in the short-term.

Project design criteria and project monitoring for noxious weeds ([See Appendix B-1 and B-2](#)) would include criteria that all heavy equipment would be cleaned prior to coming on the project area, seed, straw and other materials used for rehabilitation will be certified weed free, and all disturbed roads and landings will be seeded with a certified noxious weed free seed mix after activities occur. All noxious weed infestations would be treated using an Integrated Pest Management approach with Lawrence County. This approach could include biological,

¹⁰ Source: Black Hills Forest Plan EIS, Dec. 1996, pg III-192.

¹¹ Alternative 2: Based on 1,500 acres of commercial fuel treatments + 305 acres of FCZ impacts = 1,805 acres/.3.0% = approx. 54 acres of potential noxious weed spread.

mechanical, and chemical control methods. Integrated Pest Management procedures and project design criteria should control the increase in noxious weeds in the long-term, however increases in noxious weed infestation may occur in the short-term.

3.8.3 CUMULATIVE EFFECTS-NOXIOUS WEEDS

Combined with the cumulative effects of past activities, including the Grizzly Gulch Fire, Grizzly Gulch BAER activities, and other ongoing forest management activities on adjacent BHNH, the noxious weed resource would likely result in increased acres of noxious weeds, and could introduce new species of noxious weeds to the area. Inventory and control measures implemented under normal BLM, Black Hills National Forest, and Lawrence County noxious weed guidelines would identify noxious weed infestations and should control any increase in acres or introduction of new noxious weed species in the long-term.

3.9 SOCIAL AND ECONOMICS

3.9.1 AFFECTED ENVIRONMENT-SOCIAL AND ECONOMICS

The proposed action would have an effect on the economy of Lawrence County by creating jobs in the logging and manufacturing sectors of the economy. The project area lies entirely within Lawrence County, and it is reasonable to expect that county residents would fill most jobs created by the fuels reduction thinning. The products from thinning carried out through commercial timber sale would most likely be processed locally within 50 miles of the project area. Lawrence County has a total population of 21,802. Deadwood is the county seat for Lawrence County. There are approximately 3,576 homes within the Exemption Area Wildland-Urban Interface Project boundary¹².

3.9.2 ENVIRONMENTAL CONSEQUENCES-SOCIAL AND ECONOMICS

Effects common to all alternatives

The estimated cost of preparing the environmental analysis documentation, \$310,000.00, is considered a non-recoverable cost, and will be applied to each alternative.

Alternative 1: No Action

This alternative proposes no action and produces no economic outputs. Planning, analysis, and public disclosure costs are incurred regardless of which alternative is selected. This planning cost would generate approximately parts of 5 jobs (BLM internal planning only),

¹² U.S. Census Bureau, 2000 Census.

and \$84,000.00 in employee compensation. There is no return on this investment, no timber would be harvested, and no fuel reduction would be accomplished.

Alternative 2: Proposed Action

The proposed action is to treat approximately 2,675 acres of fire hazard areas. The treatment is a combination of mechanical thinning, thinning by hand, noncommercial fuels reduction, and pile or broadcast burning. There are two ways to achieve the objectives of the proposed action. The first is to contract out the thinning, piling, and burning of the thinning materials. The second is to let a commercial timber sale for the merchantable products, and follow up with a contract to cut and pile the sub-merchantable materials. It must be noted that while there are two methods of achieving the project objectives, only the economic impacts differ between the methods. Under current market conditions, the commercial thinning option appears to be economically feasible. However, between the time of this analysis and implementation of the project, market conditions may change to the extent that the commercial thinning option is no longer feasible. Therefore, both options are portrayed within the analysis of the proposed action.

Option 1: Non-Commercial Thinning

This option would treat approximately 2,675 acres of fuels, and create 47 jobs worth \$579,000 for the local economy. Using non-commercial thinning the smaller trees would be cut, piled, and burned with no product recovery. In stands with slopes under 40%, this activity would be done mechanically. A feller-buncher would cut and pile the trees for burning. In stands with slopes over 40%, the trees would be hand felled, and piled for burning. The estimated per acre costs and total costs are listed in Table 23.

The acres in the post-fire fuel treatments for this project area have also been commercially salvaged under the Grizzly Gulch Fire Hazard Tree and Salvage EA. Post-salvage harvest fuels reduction is being analyzed under this document. After the Grizzly Gulch Fire salvage operation is completed, the stands will be re-entered, and the sub-merchantable fuels treated. The remaining fuels are mostly small diameter trees and would be hand felled, piled, and burned.

Table 23: Treatment Cost – Alternative 2: Option #1-Non-Commercial Thinning

Treatment Type	Acres	Cost per Acre ¹	Total Cost
Non-Commercial Thinning – Mechanical	1,500	\$750.00	\$1,125,000.00
Non-Commercial Thinning – Hand Fall and Pile	115	\$900.00	\$103,500.00
Post Fire Fuel Treatments – Grizzly Gulch	755	\$250.00	\$188,750.00
Fire Containment Zone Treatments	305	\$750.00	\$228,750.00
Totals:	2,675	-----	\$1,646,000.00

¹ Treatment cost estimates provided by Terry Chaplin, Bureau of Land Management, South Dakota Field Office.

Option 2: Commercial Thinning with Follow Up Treatment of Non-Commercial Fuels.

This option would treat approximately 2,675 acres of fuels, create 47 jobs worth \$819,000 for the local economy, and produce 2754 CCF of forest products for local industry. In this option, the stands would be commercially thinned. Products such as sawlogs, posts, and poles would be removed. The logging system analyzed for this scenario is a whole tree system;

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using a feller-buncher to fall and pile the trees and a rubber tired grapple skidder to skid the trees to the landing. At the landing, a processor de-limbs the trees, and cuts the merchantable products from the boles. The tops and limbs would be piled for disposal at the landing.

After the commercial logging, an additional entry would be needed to treat the sub-merchantable trees. The treatment would be either hand or machine felling and piling for burning, the same as in the non-commercial thinning treatment. The cost per acre was estimated based on hand falling, piling, and burning of the trees.

The analysis of this option has two parts. First, the logging costs, product value and stumpage rates are determined for the commercial thinning portion of the option. Then, the remaining fuels work is costed out similar to Option 1. If the post and pole market continues its downward trend the material from this project may not have any economic value. If this occurs then the commercial thinning operations may have to be restricted to those stands with larger sawlog components. After the commercial thinning operation is completed, the stands would be re-entered, and the sub-merchantable fuels would be treated. It is estimated that 90% of the bole volume would be removed in the commercial thinning. The remaining fuels are small diameter trees, and will be hand felled, piled, and burned. The estimate for this treatment is \$250.00 per acre.

Table 24: Treatment Cost – Alternative 2: Option #2 Commercial Thinning

Treatment Type	Acres	Cost per Acre	Total Cost
Commercial Thinning – Mechanical	1500	\$250.00	\$375,000.00
Non-Commercial Thinning – Hand Fall and Pile	115	\$900.00	\$103,500.00
Post Fire Fuel Treatments – Grizzly Gulch	755	\$250.00	\$188,750.00
Fire Containment Zone Treatments	305	\$750.00	\$228,750.00
Totals:	2675	-----	\$896,000.00

3.9.3 SUMMARY-SOCIAL AND ECONOMICS

The economic impacts of each alternative are portrayed in two manners. First is the cost of implementation – the financial efficiency of each alternative. Second are the outputs for each alternative – merchantable material produced, acres of fuels treated, number of jobs created, and the income from those jobs.

Economic Efficiency: Alternative costs are broken into two categories, Administrative and Activity. Administrative costs are those costs associated with planning and implementation of the project. Sale or contract preparation and contract administration costs are estimated to be the same for both Alternative 2 options. The planning costs are the same for each alternative. Activity costs and revenues are the costs and revenues realized by implementation of the alternative. The most financially efficient alternative is the one that achieves the project objectives for the lowest per unit cost. [Table 25](#) shows the costs and revenues by alternative.

Table 25: Costs and Revenues by Alternative

Costs / Revenues	Alternative 1 No Action	Alternative 2 Option #1: Non- Commercial Thinning	Alternative 2 Option #2: Commercial Thinning
Activity Costs and Revenues			
-Commercial Harvest (Revenue)	0	0	\$44,511
Fuel Treatment Costs	0	\$1,646,000	\$896,000
Administrative Costs			
-Planning & Documentation	\$310,000	\$310,000	\$310,000
-Sale Prep and Harvest Admin	0	\$250,000	\$250,000
Total Costs	\$310,000	\$2,206,000	\$1,456,000
Total Revenue	0	\$0	\$44,511
Total Costs minus Total Revenue	\$310,000	\$2,206,000	\$1,411,489
Cost per Acre of Treatment	0	\$824	\$527

Discussion

Alternative 1 does not meet the objectives of the project. The fire threats to the communities at risk are not reduced. Both options for Alternative 2 achieve the objectives of the project. The commercial thinning option is the most financially efficient method for implementing the alternative, at \$527 per acre treated. The non-commercial thinning option is the least efficient method for implementing the alternative, at \$824 per acre treated.

The cost of suppression and rehabilitation for the Grizzly Gulch Fire was approximately \$578 per acre. This cost does not include damage to private property, loss of timber, structures, and property values. A wildfire burning into the towns of Lead and Deadwood could easily cost as much to suppress as the Grizzly Gulch Fire. Loss of property, or human life could easily push the total economic impact of a wildfire over the least efficient per acre cost of reducing the hazard.

Outputs by Alternative: Alternative outputs are what are actually produced by implementing the alternative. Outputs for this project are acres treated, volume of forest products produced, number of jobs created, and the income from those jobs. The income is not treated as revenue in the financial efficiency analysis because it is not revenue direct to the government. Table 26 shows the outputs by alternative.

Table 26: Outputs by Alternative

Outputs	Alternative 1	Alternative 2 Option #1 Non-Commercial Thinning	Alternative 2 Option #2 Commercial Thinning
Forest Products			
Sawlogs (CCF)	0	0	2539
Post and Poles (CCF)	0	0	215
Jobs and Income			
Total Jobs (direct and indirect)	5	47	47
Total Income (direct and indirect)	\$84,000	\$579,000	\$819,000

Discussion: Alternative 1 produces no outputs besides the jobs and income created by analyzing the proposal. Both options for implementing Alternative 2 treat 2,675 acres, and

create approximately 47 jobs. The commercial thinning option also produces 2754 CCF of merchantable forest products for local industry to utilize. While this option creates the same number of jobs as the non-commercial option, they are higher paying jobs. Mill workers and loggers are paid at a higher rate than laborers. Implementation of option 2 would have the best economic impact on Lawrence County.

3.10 CRITICAL ELEMENTS OF THE HUMAN ENVIRONMENT

The BLM environmental analysis process requires the consideration of those elements of the human environment considered important to the quality of human life (BLM Handbook H-1790-1). The following elements of the human environment are subject to requirements specified in statute, regulation, or executive order and must be considered in all environmental analysis documents.

Air Quality

This proposal would have some short-term impacts on air quality standards, due to pile burning, concentrated fuels burning, and prescribed fire treatments; however, air quality levels would comply with all State and Federal air quality regulations. Burning or prescribed fire activities would be accomplished during weather conditions that would minimize the impacts of smoke on nearby communities and the air quality of monitored reference sites. An approved burn plan would be incorporated and include procedures to control the amount of smoke created by fuel reduction treatments.

Areas of Critical Environmental Concern (ACEC)

There are no ACEC's in the Exemption Area or within the BLM treatment areas; therefore, there would be no impacts on any ACEC's.

Cultural Resources

A Class III field survey was accomplished during the summer of 2002 and the known cultural resources have been identified and would not be impacted by the proposed treatment activities. Any new cultural resource sites discovered during treatments would be reported to the BLM Archeologist and SHPO office and would be protected. The analysis for cultural resources is found in the Cultural Resource section in Chapter 3 and the project files. Specific project design criteria for protection of cultural resource values are noted in [Appendix B](#), Project Design Criteria.

Environmental Justice

While Native American, Hispanic, or other minority populations may live near or within the project area, there would be no disproportionate negative effects on any minority or low-income populations by the proposed action or any of the activities proposed for this project.

Farmlands

No prime or unique farmlands are identified in the treatment areas for the proposed action; therefore, no impacts to prime or unique farmland would occur from implementation of the proposed action.

Floodplains

The project area does not contain floodplains as defined by E.O. 11988; therefore, the proposed project and activities would have no impact to this resource.

Invasive, Non-Native Species

Prior surveys in the project area have identified non-native invasive plant species including: tansy, St. Johnswort, leafy spurge, Canada thistle, mullein, yellow toadflax, and houndstongue (Grizzly Gulch Fire-Hazard Tree and Salvage EA, July 29, 2002).

The proposed action and the fuel reduction activities would cause ground-disturbing impacts and may result in the spread of noxious weeds and other invasive plant species. Noxious weed project design criteria would be implemented and design criteria to reduce the spread of noxious weeds and invasive species would be used. Heavy equipment used in the treatments would be washed before entering the project area and areas with ground disturbance would be seeded with an approved grass seed mixture to reduce the spread of noxious weeds and other invasive species. A complete analysis for noxious weeds is found in Chapter 3 and in the project files. Specific project design criteria for noxious weeds are noted in [Appendix B: Project Design Criteria](#).

Native American Religious Concerns

No religious concerns or specific areas of traditional use have been reported for the analysis area, and no conflicts are anticipated with the American Indian Religious Freedom Act of 1978.

Threatened and Endangered Species

Consultation with USFWS noted that no Threatened, Endangered, or Proposed Listed Species are known in the project area; therefore, no effect would occur on any Threatened, Endangered, or Proposed wildlife, fish, or plant species. The complete analysis for T&E wildlife species is found in the Wildlife Section, Chapter 3 and in the project files.

Wastes-Hazardous or Solid

The only material that constitutes a hazardous waste as defined by the EPA associated with the proposed project would be ordinary fuel (gas and diesel) and motor oils or hydraulic fluids. These materials will be distributed and used in containers designed for their use. Caution will be exercised when transferring the material as not to allow spills to occur. If a spill does happen, it will be cleaned up immediately and moved to a site that is designed to handle the recycling or disposal of the material.

Water Quality

Perennial and intermittent streams with their associated riparian areas within the project area would be protected with a minimum 50-foot Streamside Management Zone (SMZ). The SMZ will need to be widened where steep slopes border the stream corridor. As identified in the South Dakota Forestry Best Management Practices (BMP's), this SMZ criteria would protect water quality during and after treatments. All treatments and associated equipment activity would be in compliance with the SMZ and any stream crossings would need to comply with BMP's. Based on proper management practices and the maintenance of the SMZ, the proposed action and the fuels reduction activities would not cause adverse impacts to water quality. The complete analysis for water quality is found in Chapter 3 and the project files. In addition, specific project design criteria to protect water quality, streams, and riparian areas are noted in the Project Design Criteria in [Appendix B](#).

Wetlands/Riparian Zones

The use of South Dakota Forestry Best Management Practices (BMP's) and project design criteria for protection of water quality would protect any wetlands and riparian zones in the project area; therefore no adverse impacts would occur on wetlands or riparian areas.

The complete analysis of impacts on wetlands and riparian zones is found in the Watershed/Soils section in Chapter 3 and in the project files. In addition, specific project design criteria to protect water quality, streams, and riparian areas are noted in [Appendix B](#).

Wild and Scenic Rivers

There are no designated or proposed Wild and Scenic Rivers in the project area; therefore, no designated Wild and Scenic Rivers would be affected by the proposed project or fuel reduction activities.

Wilderness and Wilderness Study Areas

Wilderness: There are no lands designated as wilderness or wilderness study areas in the project area; therefore, there would be no impacts on any designated wilderness area or wilderness study areas.

3.11 OTHER ENVIRONMENTAL DISCLOSURES

Unavoidable Adverse Effects

- There would be unavoidable short-term (<10 years) adverse effects in terms of soil disturbance, soil displacement, and some minor soil compaction.
- Some short-term effects from smoke could impact the surrounding communities during burning of fuels.
- There would be unavoidable short-term adverse effects on some wildlife species. No T&E wildlife species would be affected.

- Some short-term increase in noxious weeds and other invasive plant species is probable; however, use of Integrated Pest Management procedures should limit any increases, and control measures (washing of equipment, chemical control, and seeding of disturbed areas) should control or eliminate any new or expanding populations of noxious weeds or other invasive plant species.

Irreversible and Irretrievable commitments of Resources

There are no irreversible or irretrievable commitments of resources as a result of implementation of the proposed action or alternatives. Treatment areas would continue to be maintained as forested areas and managed by the BLM for under existing RMP direction.

3.12 LIST OF PREPARERS

This section includes a list of preparers of the environmental document. The following individuals were primarily responsible for developing the environmental analysis.

Enterprise T.E.A.M.S, USDA-Forest Service

Marti Dodds

Position: Landscape Architect
Contribution: Visuals and Recreation analysis

Tim Holden

Position: Wildlife Biologist
Contribution: Wildlife analysis

Greg D. Lind

Position: IDT Leader
Contribution: Analysis Team Leader, EA document

P. Cavan Maloney

Position: Hydrologist
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Neil McCusker

Position: Silviculturist
Contribution: Silvicultural and Forest Vegetation analysis

Francis Mohr

Position: Fuels/Fire Specialist
Contribution: Fuels/Fire Management analysis

Mike North

Position: Timber Specialist
Contribution: Social-Economics analysis

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Position: Archeologist
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Marian Atkins

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Contribution: Fuels and Fire analysis review

Barry Williams

Position: BLM Archeologist
Contribution: Cultural analysis and review

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Position: BLM Lands & Wildlife Biologist
Contribution: Wildlife analysis review

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Position: BLM Outdoor Recreation
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Contribution: Silvicultural, Timber, Economic,
Recreation, and Visual analysis
review

Russell Pigors

Position: BLM Physical Scientist
Contribution: General analysis review

Gerald Moller

Position: BLM Range Technician
Contribution: Noxious weed analysis review

3.13 CONSULTATION AND COORDINATION

The following is a list of Federal and State Agencies, Tribes, State and Local Governments, Businesses, and Organizations that were sent scoping letters, responded to scoping letters, or consulted during this analysis. A complete mailing list of all contacts, including individuals, is found in the project files.

Federal and State Agencies, State and Local Governments, Businesses and Organizations

ACHP, Lakewood, CO
 Augustana College, Sioux Falls, SD
 Black Hills Electric Cooperative, Inc., Custer, SD
 Black Hills Development, Deadwood, SD
 Black Hills Power & Light Company, Rapid City, SD
 City of Deadwood, Deadwood, SD
 City of Lead, Lead, SD
 Dakota Resource Advisory Council (RAC)
 Day's of '76 Association, Deadwood, SD
 Deadwood Fire Department, Deadwood, SD
 Defenders of Wildlife, Missoula, MT 59802
 Golden Reward Mining Co., Lead, SD
 Homestake Mining Company, Lead, SD
 Independent School District #2, Deadwood, SD
 Lawrence County Commissioners, Deadwood, SD
 Lawrence County Fire Advisory Board, Deadwood, SD
 Lead Fire Department, Lead, SD
 Midwest Motels of Deadwood, Deadwood, SD
 Office of Senator Daschle, Rapid City, SD
 Office of Senator Johnson, Rapid City, SD
 OTNO Development Corp., Lead, SD
 SD Dept. of Game, Fish, & Parks, Rapid City, SD
 SD Dept. of Game, Fish, & Parks, Trails Office, Lead, SD
 SD Dept. of Game, Fish, & Parks, Pierre, SD
 SD Dept. of Game, Fish, & Park, Natural Heritage Program, Rapid City, SD.
 SD Division of Wildfire Suppression, Rapid City, SD
 SD Dept. of Forestry, Lead SD
 South Dakota Governor's Office, Pierre, SD
 State Historic Preservation Office, Pierre, SD
 The Nature Conservancy, Rapid City, SD
 USDA, NRCS, Belle Fourche, SD
 USDA, Black Hills National Forest, Custer, SD
 USDI, Fish & Wildlife Service, Pierre, SD
 W & W Properties LLC, Desmet, SD

Tribal Governments

Cheyenne River Sioux Tribe, Eagle Butte, SD
 Cheyenne-Arapaho Tribe, Concho, OK
 Crow Creek Sioux Tribe, Ft. Thompson, SD
 Crow Tribe, Crow Agency, MT
 Eastern Shoshone Tribe, Fort Washakie, WY
 Flandreau Santee Sioux Tribe, Flandreau, SD
 Ft. Peck Assiniboiné & Sioux Tribes, Poplar, MT
 Gros Ventre & Assiniboiné Tribes, Harlem, MT
 Lower Brule Sioux Tribe, Lower Brule, SD
 Mandan, Hidatsa & Arikara Nation, New Town, ND
 Medicine Wheel Coalition, Riverton, WY
 Northern Arapaho Tribe, Fort Washakie, WY
 Northern Cheyenne Tribe, Lame Deer, MT
 Oglala Sioux Tribe, Pine Ridge, SD
 Oglala Sioux Tribe, Kyle, SD
 Rosebud Sioux Tribe, Rosebud, SD
 Rosebud Sioux Tribe, Mission, SD
 Santee Sioux Tribe of Nebraska, Niobrara, NE
 Sisseton-Wahpeton Dakota Nation, Sisseton, SD
 Spirit Lake Sioux Tribe, Ft. Totten, ND
 Standing Rock Sioux Tribe, Ft. Yates, ND
 The Lakota National Journal, Rapid City, SD
 Three Affiliated Tribes, New Town, ND
 Three Affiliated Tribes, Belcourt, ND
 Yankton Sioux Tribe of SD, Ames, IA
 Yankton Sioux Tribe of SD, Marty, SD

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3.15 GLOSSARY

Age class- an age grouping of trees according to an interval of years, usually 20 years. A single age class would have trees that are within 20 years of the same age, such as 1-20 years or 21-40 years.

Basal area- the area of the cross section of a tree trunk near its base, usually 4 and 1/2 feet above the ground. Basal area is a way to measure how much of a site is occupied by trees. The term basal area is often used to describe the collective basal area of trees per acre.

Best Management Practices (BMP) - a practice or combination of practices that are the most effective and practical (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

Board foot- a measurement term for lumber or timber. It is the amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide.

Bole- the part of a tree that is actually the tree trunk or main stem. .

Broadcast burn- a prescribed fire that burns a designated area. These controlled fires can reduce wildfire hazards, improve forage for wildlife and livestock, or encourage successful regeneration of trees.

Canopy closure - the progressive expansion of trees crowns as they spread laterally, increasing canopy cover. The degree to which the canopy (forest layers above one's head) blocks sunlight or obscures the sky.

Coarse Woody Debris (CWD) - any piece(s) of dead woody material > 3" diameter, e.g., dead boles, limbs, and large root masses on the ground or in streams.

Cover type- stands of a particular vegetation type that is composed of similar species. A forest or stand type defined by its vegetation (particularly its composition and local environmental factors). Classification is based on the percent of an area occupied by tree species.

Crown - the upper portion of a tree or other woody vegetation that supports branches and foliage.

Crown Base Height – an indicator that measures the ladder fuels in a forest stand and how much the smaller understory trees reach up to overlap the branches on the larger trees in the stand.

Crown Bulk Density – an indicator that measures how close to each other the tree branches or crowns of adjacent trees are in a stand.

Crown fire—a fire that burns through the entire vegetation canopy. It may or may not include a surface fire burning through the dead leaves and litter near the ground surface.

Crown height- the distance from the ground to the base of the crown of a tree.

DBH (Diameter at Breast Height)- the diameter of a tree 4 and 1/2 feet above the ground on the uphill side of the tree.

Density (tree or stand density) - the quantity of trees that occupy a unit of land; commonly expressed as basal area and/or number of trees by size and spacing.

Desired future condition- land or resource conditions that are expected to result if goals and objectives are fully achieved.

Fire cycle- the average time between fires in a given area.

Fire frequency - the number of wildland fires started in a given area over a given time.

Fire intensity - the rate of heat energy released per unit time per unit length of fire front. Numerically, it is the product of the heat of combustion, quantity of fuel consumed per unit area in the fire front, and the rate of spread of a fire, in BTU per second per foot of fire front, or in kilowatts per meter.

Fire regime - the characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire.

Fire return interval: the period of time between fires.

Fire risk: fire risk is defined as the probability that a fire will occur. It does not indicate likelihood of a fire becoming large.

Fire suppression - all work and activities associated with fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Fuel bed: the amount, structure, and arrangement of forest fuels.

Fuel break: a wide strip of land where hazardous fuel has been removed for in anticipation of fighting fires. Fuel breaks divide fire-prone areas into smaller parcels for easier fire control and provide access for fire fighting.

Fuel loading: the weight of fuel present at a given site; usually expressed in "tons per acre". This value generally refers to the fuel that would be available for consumption by fire.

Fuel profile: the amount and characteristics of live fuel and coarse woody debris in a given area. The amount is referred to as fuel loading, and the characteristics include the horizontal and vertical arrangement and continuity of fuels that affect the spread and intensity of fire.

Fuel treatment: the rearrangement or disposal of fuels to reduce fire hazard or to accomplish other resource management objectives.

Fuels or fuels complex: the structure and arrangement of forest fuels.

Fuels- plants and woody vegetation, both living and dead, that is capable of burning.

3.15 GLOSSARY

Habitat type- a way to classify land area. A habitat type can support certain climax vegetation, both tree and undergrowth species. Habitat typing can indicate the biological potential of a site.

Hazard tree: a tree that has been identified as a potential risk for failure that would cause injury to a person or property.

Historical Range of Variability (HRV) - a term that characterized fluctuations in ecosystem conditions or processes over time. It can describe variations in diverse characteristics, such as tree density, vertebrate population size, water temperature, frequency of disturbance or rates of change, and it can be applied at multiple spatial scales from the site to regions comprising millions of acres or more.<

Hydrophobic soils (water repellent soils) - a condition where soils after a fire sweeps through an area and organic particles are heated to such an extent (vaporized) that as these gases cool and condense, they are chemically bonded to the soil mineral particles and are rendered extremely water repellent with varying thickness of hydrophobic soils remaining.

Integrated Pest Management (IPM)- evaluates alternatives for managing forest pest populations, based on consideration of pest-host relationships.

Intensity--in the general sense intensity implies the size of the flames, the fire's spread rate, and the rate of energy released from the fire.

Intermittent stream- a stream that flows only at certain times of the year when it receives water from streams or from some surface source, such as melting snow.

Irretrievable- one of the categories of impacts mentioned in the National Environmental Policy Act to be included in statements of environmental impacts. An irretrievable effect applies to losses of production or commitment of renewable natural resources.

Irreversible- a category of impacts mentioned in statements of environmental impacts that applies to non-renewable resources, such as minerals and archaeological sites. Irreversible effects can also refer to effects of actions that can be renewed only after a very long period of time, such as the loss of soil productivity.

Ladder fuels- vegetation located below the crown level of forest trees that can carry fire from the forest floor to tree crowns. Ladder fuels may be low growing tree branches, shrubs, or smaller trees.

Landing- any place where cut timber is assembled for further transport from the timber sale area.

Large Woody Debris (LWD) - logs or pieces of dead woody material large enough to become lodged or imbedded in a stream. Type and size of material designated as large or coarse woody debris varies among classification systems

Logging residue (slash)- the residue left on the ground after timber cutting. It includes unutilized logs, uprooted stumps, broken branches, bark, and leaves. Certain amounts of slash provide important ecosystem roles, such as soil protection, nutrient cycling, and wildlife habitat.

Mechanical treatment: refers to the use of machinery to remove timber or treat vegetation in an area. Timber harvest is an example of mechanical treatment.

Middleground- a term used the management of visual resources, or scenery. It refers to the visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the stand.

Monitoring and evaluation- the periodic evaluation of forest management activities to determine how well objectives were met and how management practices should be adjusted. See "adaptive management".

National register of historic places - a listing (maintained by the U.S. National park Service) of areas that have been designated as being of historical significance. The register includes places of local and state significance as well as those of value to the nation.

NEPA (National Environmental Policy Act) - Congress passed NEPA in 1969 to encourage productive and enjoyable harmony between people and their environment. One of the major tenets of NEPA is its emphasis on public disclosure of possible environmental effects of any major action on public lands. Section 102 of NEPA requires a statement of possible environmental effects to be released to the public and other agencies for review and comment.

Noncommercial vegetative treatment- the removal of trees for reasons other than timber production.

Noxious weed - an officially designated plant species that is undesirable; conflicts, restricts, or otherwise causes problems with management objectives. Designated as noxious weeds by the Secretary of Agriculture or by the responsible state official.

OHV- off-highway vehicles, such as motorcycles, 4-wheel drive vehicles, and 4-wheelers.

Overstory - in a forest of more than one age class, that portion of the trees forming the upper or uppermost canopy.

Partial retention- a visual quality objective that, in general, means man's activities may be evident but must remain subordinate to the characteristic landscape.

Patch- an area of homogeneous vegetation, in structure and composition.

Perennial stream: a stream or portion of a stream that flows throughout the year.

Pole timber- trees at least 5 inches in diameter, but smaller than the minimum size for sawtimber.

Pole/sapling- the stage of forest succession in which trees are between 3 and 7 inches in diameter and are the dominant vegetation.

Precommercial thinning - a thinning that does not yield trees of commercial value, usually designed to reduce stocking in order to concentrate growth on the more desirable trees.

Prescribed burning: management-ignited fire in which areas are burned under controlled conditions.

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Prescribed fire- fire set intentionally in wildland fuels under prescribed conditions and circumstances. Prescribed fire can rejuvenate forage for livestock and wildlife or prepare sites for natural regeneration of trees.

Prescription- management practices selected to accomplish specific land and resource management objectives.

Project file - the report, correspondence and meeting notes that were part of the planning and analysis process.

Proposed Action (PA) - in terms of NEPA, the project, activity, or decision that a federal agency proposes to implement.

Range of Variability - the components of healthy ecosystems fluctuate over time. The range of sustainable conditions in an ecosystem is determined by time, processes (such as fire), native species, and the land itself. For instance, ecosystems that have a 10 year fire cycle have a narrower range of variation than ecosystems with 200-300 year fire cycle. Past management has placed some ecosystems outside their range of variability. Future management should move such ecosystems back toward their natural, sustainable range of variation.

Reburn--fire burning through an area that has previously burned but still includes some flammable fuel.

Reforestation- the restocking of an area with forest trees, by either natural or artificial means, such as planting.

Resilience- the ability of an ecosystem to maintain diversity, integrity, and ecological processes following a disturbance.

Responsible official- the government employee who has been delegated the authority to carry out a specific planning action.

Retention - a visual quality objective; human activities are not evident to the casual forest visitor.

Revegetation- the re-establishment and development of a plant cover by either natural or artificial means, such as re-seeding.

Riparian area - geographically delineated areas, with distinctive resource values and characteristics, that are comprised of the aquatic and riparian ecosystem, floodplains and wetlands. Riparian areas may be associated with lakes, reservoirs, estuaries, potholes, springs, bogs, wet meadows, and ephemeral, intermittent, or perennial streams.

Salvage harvest - removal of dead trees or trees being damaged or dying due to injurious agents other than competition, in order to recover value that would otherwise be lost.

Sapling- a loose term for a young tree more than a few feet tall and an inch or so in diameter that is typically growing vigorously.

Sawtimber- trees that are 9 inches in diameter at breast height or larger that can be made into lumber.

Sediment delivery - eroded soil that reaches a stream course.

Sediment yield - the total sediment volume being moved in a stream past any given point. It includes the movement of bedload plus the movement of all finer sized rock-derived materials, and is expressed in terms of mass or volume per unit of time.

Seedling - a young tree less than 0.9 inches diameter.

Seral stages - the series of relatively transitory plant communities that develop during ecological succession from bare ground to the climax stage.

Seral- the stage of succession of a plant or animal community that is transitional. If left alone, the seral stage will give way to another plant or animal community that represents a further stage of succession.

Silvicultural system- the cultivation of forests; the result is a forest of a distinct form. Silvicultural systems are classified according to harvest and regeneration methods and the type of forest that results.

Silviculture - the science of growing and tending forest vegetation, i.e., controlling the establishment, composition, and growth of forests, for specific management goals.

Size class- one of the three intervals of tree stem diameters used to classify timber.

Skidding- hauling logs by sliding, not on wheels, from stump to a collection point.

Slash- the residue left on the ground after timber cutting or left after a storm, fire, or other event. Slash includes unused logs, uprooted stumps, broken or uprooted stems, branches, bark, etc.

Snag- a standing dead tree. Snags are important as habitat for a variety of wildlife species and their prey.

Snag dependent species - animals whose long-term existence requires the presence of standing dead trees.

Soil compaction- the reduction of soil volume. For instance, the weight of heavy equipment on soils can compact the soil and thereby change it in some ways, such as in its ability to absorb water.

Soil hydrophobicity: a condition that occurs when organic matter in litter and upper mineral soil layers is volatilized during a fire. Some of the volatilized material moves downward into the soil and condenses to form a water-repellent layer that impedes infiltration. This condition is also known as "water-repellent soil" and may occur naturally in some soils.

Soil productivity - the capacity of a soil to produce a specific crop such as fiber, forage, etc., under defined levels of management. Productivity is generally dependent on available soil moisture, nutrients, and length of growing season.

Stand - a group of trees or other vegetation occupying a specific area and sufficiently uniform in composition, age, spatial arrangement, and conditions as to be distinguishable from the vegetation on adjoining lands.

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Stand replacement fire - synonymous with "stand destroying fire" and "ecologically significant fire" which is defined as: a high intensity surface fire or crown fire which kills most of the existing vegetation and provides a set of conditions, including consumption of large woody surface fuels and removal of the entire duff layer over much of the area affected by the fire (Crane and Fischer, 1986), exposing the seedbed, opening of closed cones, and stimulation of sprouting species which leads to replacement of the pre-fire vegetation (Kilgore, 1978), and largely determines development of future stand density, age structure, and species composition (Brown, 1975).

Stand structure diversity: the horizontal and vertical distribution of components of a forest stand including the height, diameter, crown layers, and stems of trees, shrubs, herbaceous understory, snags, and down woody debris.

Strata - mapped land units that contain forest of relatively uniform density/crown closure, and age structure to provide a basis for mapping general forest structure and successional age classifications, and timber management suitability.

Structure (of forest vegetation) - the horizontal and vertical distribution of plants in a stand, including height, diameter, crown layers, and stems of trees, shrubs, herbaceous understory, snags, and coarse woody debris.

Successional stage - a stage or recognizable condition of a plant community that occurs during its development from bare ground to climax; for example, coniferous progress through six recognized states; grass-forb; shrub-seedling; pole-sapling; young; mature; and old growth.

Surface fire--fire burning in the litter and organic debris on or near the ground.

Surface fuels: fuels located on the ground.

Sustainability- the ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

Thinning- a cutting made in an immature stand of trees to accelerate growth of the remaining trees or to improve the form of the remaining trees.

Thinning from below: an even-aged silvicultural system. Thinning from below involves the removal of some of the smaller trees in the stand so the remaining large trees have more growing space and are better able to maintain vigor.

Threatened and Endangered Species (T&E): a plant or animal species identified, defined, and recorded in the Federal Register, as being in danger of extinction throughout all or a significant portion of its range, in accordance with the Endangered Species Act of 1976.

Underburning: prescribed burning of the forest floor or understory vegetation for botanical or wildlife habitat objectives, hazard reduction, or silvicultural objectives.

Understory- the trees and woody shrubs growing beneath the overstory in a stand of trees.

Vertical structure: vertical structure refers to the appearance of vegetation from the forest floor to the tallest plants or trees defined by a limited area. Stands or areas that have many different heights, and thereby having much of their surface area occupied by several to many layers of vegetation, are thought to have good vertical density or structure.

Watershed- the entire region drained by a waterway (or into a lake or reservoir). More specifically, a watershed is an area of land above a given point on a stream that contributes water to the streamflow at that point.

Wetlands- areas that are permanently wet or are intermittently covered with water.

Wildfire- any wildland fire that is not a prescribed fire.

Wildfire susceptibility: wildfire susceptibility is the combination of the probability of a fire igniting (risk) with the intensity at which it will burn (hazard).

Windthrow- trees uprooted by wind.

Yarding- moving the cut trees from where they fell to a centralized place (landing) for hauling away from the stand.

Whole Tree Yarding is where the entire tree, branches and all, are yarded to the landing, thereby reducing site fuel loads.